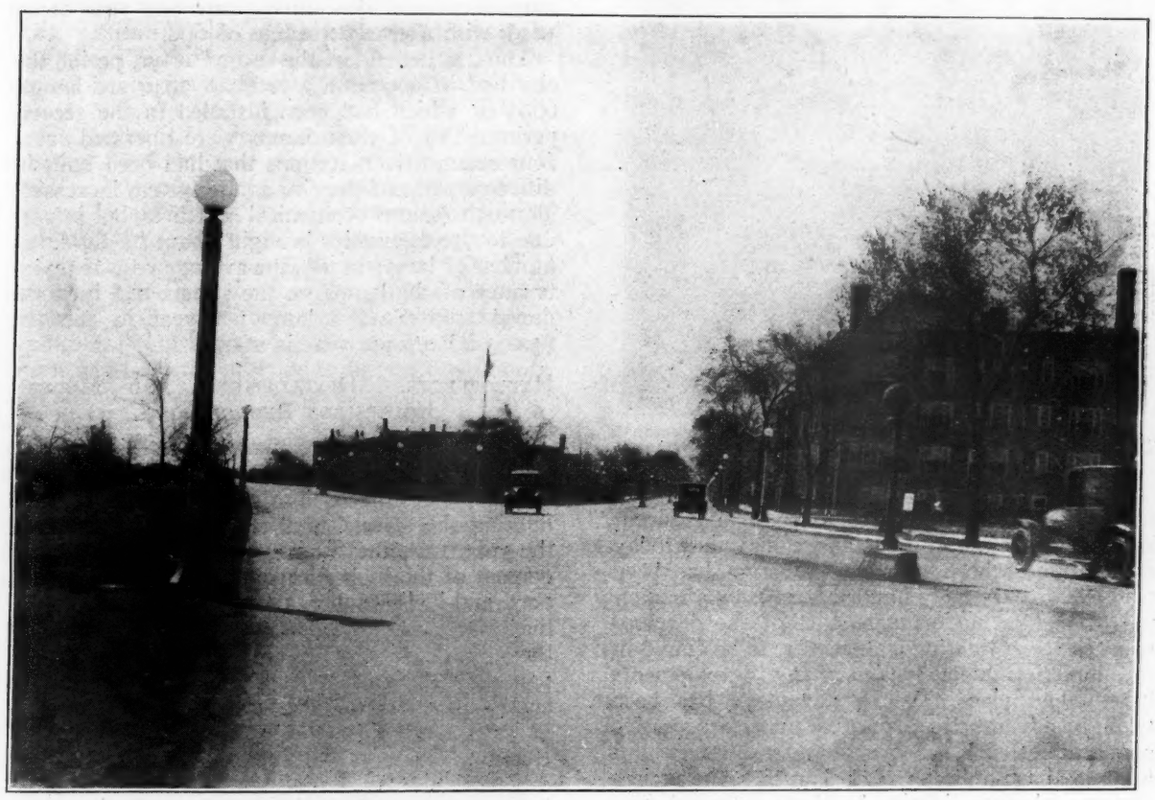
Electrical Review

VOL. 78—No. 20. CHICAGO, SATURDAY, MAY 14, 1921. PAGE 759.



View Showing Park Lighting System Extending Into City Streets Under Control of Park Board.

Street Lighting and Its Effect on Property Values

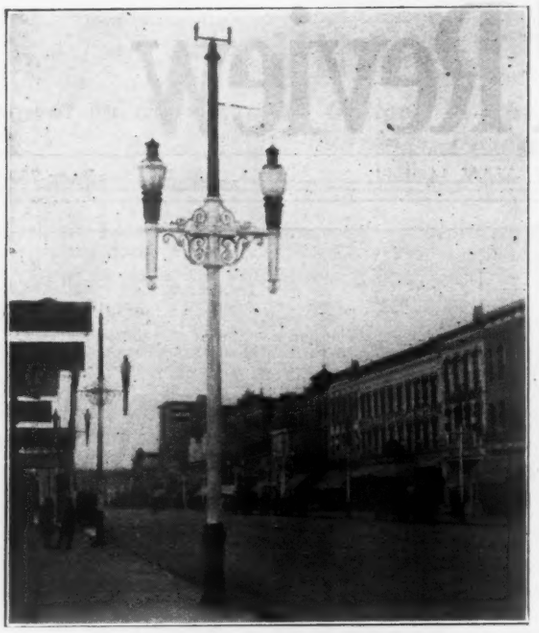
Increase in Real Estate and Business Figures Due to Illumination of Throughfares Far Exceed Expense of Lighting Systems Required to Produce the Results—Evolution of Chicago System

By C. H. SHEPHERD

Consulting Engineer, Chicago.

All progress is a function of evolution. In the early days of municipal history villages, towns and cities in the process of formation were almost wholly devoid of public utilities in any form, but public necessity has forced improvement in municipal equipment resulting in paved and periodically cleaned streets, constantly improving sewerage systems and street railways, and the telegraph and telephone have become the order of the day. Modern street lighting has been developed through many stages to supplant the old perforated tin lantern in the hands of the night watchman.

At first street illumination consisted of "beacon lighting" by means of lanterns set on posts or hung at doorways so that by passing from light to light the nocturnal wayfarer was enabled to follow the course of a street. By such means, obviously, no attempt was made to supply adequate illumination by which a person could actually see objects in general by night as well as by day, and as the need for higher lighting intensities became apparent, due to the growth and general development of municipalities, and with the progress of the arts and sciences various illuminants were devised and tried out. This process gave rise in its



Ornamental Lighting Equipment Installed at Niagara Falls, N. Y.

normal and induced course to such magnificent street illuminating systems as we may find today in locations where sufficient attention has been paid to this extremely important phase of municipal life. One unfortunate part of the development of street lighting is, however, to be found in the direction along which many developments have taken place. While advantage has been taken of advances in the art by many progressive communities, for the most part real street illumination has not been installed; rather, the ancient system of beacon lighting has been followed. The result of this is almost a total lack of direct illumination between street intersections, meaning that only the "silhouette" and "glint" effects of the beacon lights are useful as aids to vision in the centers of the blocks.

Evolution of Chicago's Great Street-Lighting System.

To a person accustomed to the effects of properly designed street-lighting systems it is but natural to base the judgment of a community on the appearance of its streets, especially after nightfall. For example, the City of Chicago some years ago found itself growing rapidly with most of the public utilities keeping pace with the growth of the city, but the street-lighting system continued in very poor shape. In the year 1887 the city undertook the solution of its street-lighting problem and for a start built a small arc-lighting plant for the purpose of lighting the bridges crossing the Chicago river at points between Rush and 12th streets. This small experiment proved to be the seed from which has grown the largest street-lighting system in the world.

Growth of the system was slow as the early opposition to this venture was both active and effective, and as a result the lighting system consisted of only 1253 lamps on Jan. 1, 1897, an average growth of 125 lamps a year for the first 10 yrs. At this time the demand for better street illumination became so insistent that the authorities decided to increase the municipal lighting system as rapidly as finances would permit. The growth of the system for the next 10-yr. period is shown in the accompanying table giving the yearly addition of lamps. During this period the number of lamps added to the system annually was subject to considerable variation—from 184 lamps the first year to 955 in the last year—the maximum number added during any one year being 1249, with a yearly average of 699.

Thus, at the end of the second 10-yr. period the city had in operation a total of 7946 arc lamps, 6693 of which had been installed in the second period. All of these lamps were operated from four steam-driven stations that had been built in different parts of the city as the system increased. Through various economical measures, but in part due to the economies brought about by the large number of lamps in use, the average cost of maintenance of the lamps on the streets had been reduced from $212 a lamp per year in 1888 to $52.93 a lamp per year in 1907.

Hydroelectric Development and Modern Equipment Reduce Costs.

This short history of the street-lighting system leads up to the time that the Sanitary District of Chicago first entered into the important work of lighting the streets of the City of Chicago. In the year 1904 the Sanitary District began development of the hydroelectric power plant at Lockport, and in December, 1907, was prepared to deliver electrical energy in the city. In July of 1907 the City of Chicago had agreed upon a price to be paid to the Sanitary District for the necessary energy to operate its street-lighting system, and had at an earlier date planned the work of changing over its steam stations to electrically driven stations. The city had also commenced to increase largely its street lighting system by the direct application of the energy to the new lamps that were being installed.

Steam-driven stations were provided with electric motors to replace the old engines, and transmission lines were installed from the existing stations to the Sanitary District terminal station at Western avenue, to which point the energy from

South State Street (Chicago) at Night With Increased Illumination.

the power plant was transmitted at high voltage and transformed to a suitable potential for distribution purposes. During 1908 some additional substations, designed to use the energy directly

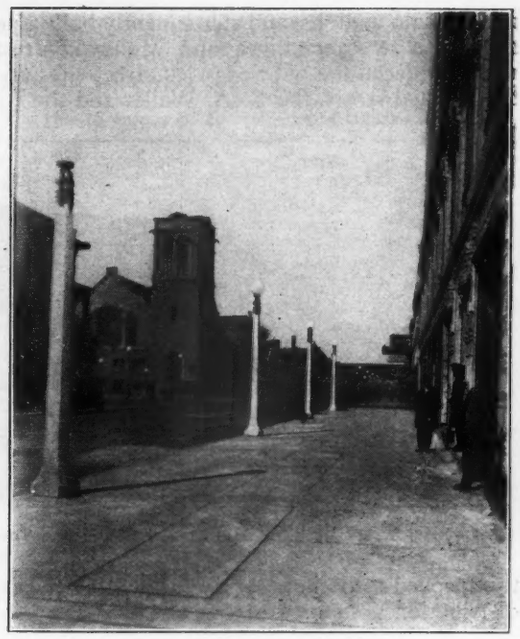
through transformers, were built and the necessary distribution circuits for street-lighting purposes were connected to these stations. These new lights, 5538 in number, could not have been added to the old system without constructing a new and expensive steam power plant which the city's financial condition would not have permitted. The use of energy purchased at a low rate from the Sanitary District and the low cost of installation made possible by eliminating the expensive steam station enabled the city to add these new lamps to the system, bringing the total number of lamps installed up to 12,246 in the year 1910.

The authorities were desirous of further increasing the lighting system of the city since the results of operation under the new conditions had proven satisfactory and the cost of maintaining each lamp had been reduced from $52.93 per yr. under steam operation at $38.16 per yr. The city, however, could not see a way open to finance an extension to its lighting system under existing conditions. During the development of the system it had been the practice to light a few important streets in each of the wards within a reasonable distance of the power station. This method, which was made necessary because of lack of available funds, left much of the territory in an unlighted or very poorly lighted condition. To carry out a comprehensive system of street lighting in the different sections to be lighted, and to connect additional lamps to the circuits on streets

Night Scene in Denver, Colo., Showing Well-Lighted Street.

not properly lighted, required the rebuilding of practically all of the old circuits and dismantling and rebuilding of all the old power stations in order to secure a uniform system of operation and distribution.

At that time the system consisted of an almost equal number of d-c. and a-c. arc lamps of many different designs, including both the open and inclosed types. Circuit capacities differed and no standard of construction had been followed for any great length of time, with the result that the cost of repairs and maintenance was excessive and successful operation was rendered difficult. The policy of the trustees of the Sanitary District had been to supply at cost of production, or what was assumed as such cost, all the energy the municipal bodies could use. The trustees had in several



Ornamental Lighting System That Helped to Improve Property Values.

instances advanced money needed to install the equipment required for a greater use of energy and offered a similar proposition to Chicago. After protracted discussion a contract was finally entered into. During the discussion relative to the new system the engineers made plain to both parties to the contract that the rehabilitation of the old system was as imperative as new lighting and would involve nearly as much expense. The contract as finally drawn covered the installation of a modern street-lighting system and the remodeling of the old system to conform to the later and then modern standards which were to be employed. After the details of this proposed contract had been arranged the Sanitary District undertook the operation of all city arc lamps for installation along Dearborn street. The third supplemental agreement added 11,000 units of 450-watt capacity, adjusted certain construction conditions and further provided for the elimination of all old types of lamps, making the system modern throughout.

The original contract was made effective by signature of the proper officials on Oct. 27, 1910, and after Dec. 5, 1910, the Sanitary District operated and maintained all of the substations required for city lighting service. The contract required that the lamp locations should be furnished at the rate of 500 each month, and when 3000 lamps had been located a substation location for the operation of these lamps was to be decided upon and construction commenced. The accompanying table gives the dates that lamp locations were furnished during the first 2 yrs. that the contract was in force.

Specifications for new substations were issued for Wabansia on Aug. 12, 1911; for Byron street on Feb. 15, 1912; for 22nd street on Feb. 15, 1912, and for 39th street on May 16, 1912. These were completed in the order named on March 1, 1912; Nov. 21, 1912; Dec. 26, 1912, and Nov. 27, 1912. In addition to the construction of the four new substations the Sanitary District remodeled

and Lincoln stations, and subsequently built a new substation at Menominee and Mohawk streets, which replaced the old Sedgwick street substation the Halsted street, the R. A. Waller and the Rice

Ornamental Street Lightind Standards in Suburban Town.

that proved to be improperly located for the new distribution system.

District Greatly Improved by Construction of Lighting System.

The result of the construction of this enormous street-lighting system was to better all conditions throughout the surrounding territory; public safety was greatly increased, population was drawn to the lighted areas, traffic became heavier, better classes of buildings went up, business was greatly augmented, and as a natural result property values increased in proportion to the growth of business and population. During this same period the large park systems of Chicago were expanding their lighting systems, not only in the park interiors but also along the various boulevards under their control. For instance, Lincoln Park lighted Sheridan Road as far north as Devon avenue, Lake Shore Drive south to Grand avenue, Diversey boulevard west to the Chicago river, Fullerton Parkway west to Orchard street, Lincoln Park west and all interior park drives, resulting in a tremendous increase in traffic. How this affected property values will be seen later.

The West and South Park systems also modernized much of their boulevard lighting equipment, especially along the South Shore drive and Garfield boulevard as well as in Jackson, Western and Washington boulevards. The general effect of these improvements will be seen by reference to the accompanying data secured from prominent real estate men of Chicago, and by reference to the accompanying map showing the various lighting districts of the city with their respective dates of installation. The increase in property values coincident with improved street lighting is apparent.

Percy Wilson of Frederick H. Bartlett & Co. is quoted verbatim as follows: "In 1906 we sold frontage on 63rd street west of Ashland avenue at $50 per ft. The same frontage is now worth $300 per ft. In 1900, H. W. Harpold consummated the sale of the southwest corner of Sheridan Road and Wilson avenue to the North Shore Congregational Church at $17,500, which I understand was recently sold for $550,000.

"During our sale of Bartlett's Bencoma Park subdivision in 1912, lots facing 75th street between East End and Jeffery avenues were sold on easy terms for $499 each. This street is now developing into business property and lots are worth more than double the 1912 price.

"In 1910, Wilson avenue frontage east of Broadway was worth $250 per ft., and in 1920 Wilson avenue frontage east of Broadway was worth $1750 per ft.

"In the fall of 1916 we placed on the market the now well known Greater Chicago subdivision lying for 1.5 mi. along the Illinois Central railroad and Cottage Grove avenue and containing 420 acres comprising 3200 lots aggregating $4,700,000 in value. Before the sales work had proceeded to much extent we found that we were limited in our exposition time to daylight only. Therefore we strung powerful arc lights across 103rd street through the center of the property and materially increased our sales by showing the property at night to those people who do not go out during the day."

Louis Zuckerman of the City Realty Co., who has observed the effect of street lighting on property values on the north side for many years, cites the following remarkable specific instance: Street lighting sometimes determines to a great extent the values of business property. An example of this is the property at 4853-73 Broadway. This property was occupied as a coal yard for a number of years, and Broadway at this point was a very poorly lighted street. The value was not over $150 per ft. This property, which is 261 ft. wide, was improved with 15 stores, and six attractive high-powered street lamps were placed in front of the property. The change has been such as to increase the ground value to $1000 per ft. The traffic which formerly was on the other side of the street has been attracted to the near side by the bright illumination, and the east side of Broadway north of Lawrence avenue now carries about 75% of the foot traffic.

Brightly Illuminated Streets Attract Better Class of Trade.

Leo Heller, executive secretary of the South State Street Improvement Association, is a very enthusiastic proponent of ornamental street lighting and supplies the following information:

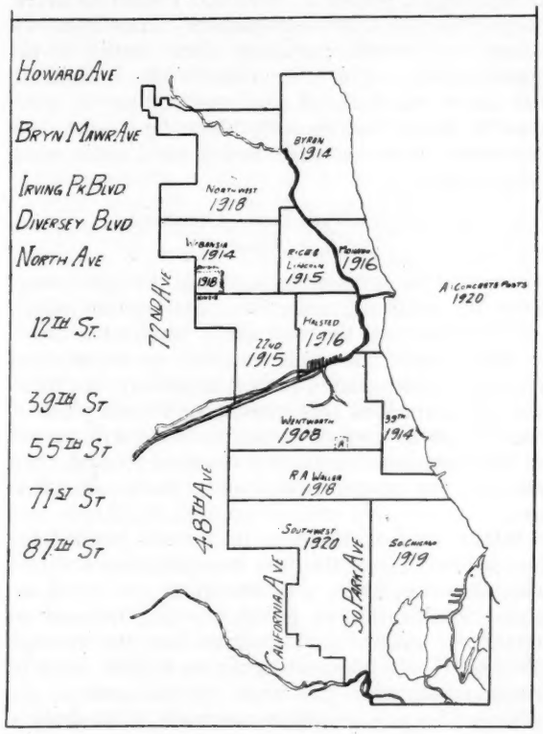
"Money should be spent to illuminate the street by night with a daylight blaze that will bring the crowds by night as well as by day. The small neighborhood groups of stores realize the detriment of a gloomy environment, and throughout the city may be seen these groups brightly illuminated with curb lighting standards.

"The new $25,000 street-lighting system installed by the South State Street Improvement Association has proven one of the most satisfactory of investments. The units consist of ornamental fixtures, especially designed for State street. They measure 6 ft. from top to bottom and hang 18 ft. above the curb. The globes are 7-panelled and of stippled glass. The lamps are the highest wattage in use for street lighting purposes and throw 1500 candle-power each (66,000 in all), the system extending from Jackson boulevard to Polk street. State street, south, at night is a blaze of attractive illumination.

"The street lighting system was put in operation in October, 1919. We watch it carefully, see that it is kept clean and bright, that breakage

is promptly repaired, and that it is maintained at best efficiency. Merchants along the street report that a better class of people patronize their stores at night and that their night business has shown a marked increase. People from all over the city have told us of the improved appearance of the street. Other business sections have consulted us and other cities have written to us for information. The City of Chicago has sent its representatives to us relative to lighting up other sections."

Success of the South State street ornamental lighting installation is beyond question, the members of the Association stating that rents and property values are on the increase, better buildings are contemplated, a better class of tenants



Map of Chicago, Showing Lighting Districts and Dates of Installation.

and businesses are gradually becoming established in this location, and the general improvement is very noticeable.

The pioneer ornamental street-lighting system on a business street in Chicago was the Dearborn street system between Polk and Lake streets. What this system has done for Dearborn street is a matter of common knowledge, and while the system as at present operating is, of course, not a strictly modern installation, still it presents a beautiful appearance at night, and could be easily redesigned and rebuilt into an ornamental system second to none. Only lack of space prevents the mention of numerous local ornamental street-lighting systems in Chicago which have had most beneficial effects on the business, rents, population and property values of the localities affected.

Advances in Realty Figures Prove Value of Good Illumination.

Taking a broad and comprehensive view of the situation throughout Chicago the opinion of the man who is best situated to obtain the proper perspective is exceedingly valuable. Harry F. Prussing, secretary of the Chicago Real Estate Board, makes the following statement:

The rise in values of the property comprising the centers of the outlying business districts in Chicago during the last 10 yrs. has been really remarkable. It is generally known by the public that transfer corners and outlying business centers have been good real estate investments, but how good they have been is realized fully by those who keep a record of sales, transfers and leases in these sections. There are a number of sound reasons for this increase in value. They include increased buying power of the large populations feeding that particular district, education of merchants to higher standards of merchandising, popularity of the moving-picture theater, better street and ornamental lighting, etc. To my mind the most important of these reasons is the last mentioned; viz., more light.

The business section in Chicago which is going back or standing still is almost in every case poorly lighted. If nothing else is done in the way of modernizing store fronts, widening sidewalks, cleaning up and remodeling old buildings, that section will immediately have more business by spending a few dollars on lighting it properly.

In a general way we have outlined in the list below the increase in values of real estate per front foot in the 10 yrs. from 1910 to 1920:

Business center.	1910.	1920.
63d St. and Cottage Grove Ave.	$ 300 to $ 400	$1,500 to $2,500
63d and Halsted Sts.	600 to 1,000	2,000 to 6,000
22d St. and Crawford Ave.	200 to 300	750 to 1,250
MadisonSt. and Crawford Ave.	300	1,500
N. Clark St and Chicago Ave.	1,000	2,500
N. Clark St. and Diversey Parkway	300	1,200
Broadway at Grace St.	300	1,000
Wilson Ave., Broadway to Sheridan Rd.	1,000	5,000
Broadway and Lawrence Ave.	350 to 500	750 to 2,500
Sheridan Rd., Montrose to Foster, except Wilson Ave. corners	150 to 250	600 to 2,000

It must be understood that there is a large difference between values of corners in the centers of these districts and the inside properties removed from the actual centers. This difference is shown in the above list by the minimum and maximum value where more than one figure is quoted under each year.

Lucky indeed is the investor who could prophesy one-half the general increase in value of these properties and who backed his judgment with his dollars. Every real estate broker promoting sales in undeveloped business districts knows that the first improvement to make is better lighting, because these outlying centers do most of their business after dark when the local resident has returned to his home and has the opportunity to do his shopping.

Chicago is a typical, wideawake, hustling, energetic American city which, due to its strategic location, has been phenomenally favored in the matter of growth. Its local lighting installations are made with a view towards augmenting the municipal lighting system which does not supply extraordinary intensities of illumination, although known the world over as the largest and most efficiently operated municipal street-lighting system in service. These local lighting systems in Chicago are often as large as the entire street-lighting systems of some smaller towns, many of which are sadly in need of proper illumination. What the local street-lighting systems have done for Chicago business centers, comprehensive street-lighting systems will do for the smaller towns.

The increase in property values due to correct ornamental street lighting is a proven fact. The success of the street-lighting system itself is a

matter of proper engineering and economic design, and should give a maximum lighting effect for a minimum expenditure, not only for installation but for maintenance and operation. Three basic principles upon which the success or failure of a street-lighting system depends are (1) efficient generation of light, (2) efficient utilization of light, and (3) designing lighting installations which will have the proper effect upon the human eye. These principles can be obtained only by proper engineering, as street lighting is a highly specialized branch of the art.

Light attracts people as it attracts moths. People make business which in its far reaching effects improves the general welfare of the community. Hence, as noted above, increase of property values due to correct street lighting far exceed the cost of the lighting system required to produce the increase. The possibilities of this situation are obvious.

TABLE SHOWING EARLY GROWTH OF STREET LIGHTING SYSTEM IN CHICAGO.

Year.	Additions to system.	Year.	Additions to system.
1897	184 lamps	1903	319 lamps
1898	272 lamps	1904	207 lamps
1899	1,183 lamps	1905	709 lamps
1900	974 lamps	1906	1,249 lamps
1901	438 lamps	1907	955 lamps
1902	203 lamps		
		Total	6,693 lamps

TABLE SHOWING DATES AND LOCATIONS OF LAMP INSTALLATIONS ORDERED.

Date.	Additions.	District.
Oct. 5, 1911	598	lamps—Wabansia Ave. section
Oct. 17, 1911	485	lamps—39th St. section
Oct. 11, 1911	3	lamps—Wentworth Ave. section
Oct. 30, 1911	656	lamps—39th St. section
Nov. 23, 1911	60	lamps—Halsted St. section
Dec. 13, 1911	3	lamps—Waller section
Dec. 22, 1911	6	lamps—39th St. section
Mar. 18, 1912	1,188	lamps—Byron St. section
Total	2,999	lamps

TABLE SHOWING WHEN AND WHERE TUNGSTEN LAMPS WERE SUBSTITUTED FOR ARC LAMPS ON CANCELLATION ORDERS.

Date.	Additions.	District.
Apr. 5, 1912	60	lamps—Wabansia Ave. section
July 15, 1912	51	lamps—Wabansia Ave. section
July 16, 1912	493	lamps—39th St. section
July 18, 1912	55	lamps—Wabansia Ave. section
July 26, 1912	189	lamps—Wabansia Ave. section
July 31, 1912	169	lamps—Wabansia Ave. section
July 31, 1912	632	lamps—22nd St. section
Aug. 1, 1912	112	lamps—Wabansia Ave. section
Aug. 7, 1912	274	lamps—Wabansia Ave. section
Aug. 14, 1912	315	lamps—39th St. section
Aug. 22, 1912	156	lamps—Rice and Lincoln section
Sep. 6, 1912	1,042	lamps—Byron St. section
Sep. 11, 1912	753	lamps—22nd St. section
Sep. 28, 1912	1,481	lamps—22nd St. section
Sep. 28, 1912	115	lamps—Wood St. section
Total	8 896	lamps

DEVELOPING POLICY IN LIGHTING-FIXTURE INDUSTRY.

Problems to Be Solved by Co-operation Between Manufacturers and Others—Paper Before Convention of Fixture Manufacturers.

By CHARLES E. VERHUNCE.

When I was given the opportunity to prepare an address on "Classification of Customers According to Purchases" which ties up under the general heading of "Developing a Policy in the Lighting-Fixture Industry," I welcomed that opportunity because I felt it gave me a chance to air what to me was a close subject, to which I had given study for some little time. It was the intention to treat this subject specifically because it is believed that any subject, before it can be handled properly, must be treated specifically; but it is not a one-man job. I think it calls for a comparison of minds to treat the subject. All that I will attempt to do is to outline some of the things, in a general way, that have occurred to me and that we must take into consideration.

Classification of customers according to purchases: We might say we have on the one hand the ultimate buyer or consumer, and on the other hand the manufacturer. You will note that I have put the consumer first. I do not put the dealer first, as is sometimes assumed by the dealers, nor the manufacturer as the manufacturers perhaps might prefer to have it. I want to drive this point home, that the consumer comes first. If it were not for the consumer there would be no manufacturer. The consumer is the individual who keeps the ball of business rolling or who stops it as he has recently done, and who, we have every reason to believe, will soon again start it on its way.

PLAN OF DISTRIBUTION TO DETERMINE FINAL POLICY ADOPTED.

Between the consumer and the manufacturer, generally speaking, comes the dealer, the jobber and in some cases the distributor also in the order of their respective importance. In connection with any contemplated policy, therefore, we must first ask ourselves this question: Which plan of distribution as applied to our product will permit of the best service to the consumer? and then map out the proper policy as to trade classification.

In the case of some of us we can render the best service by dealing as manufacturers direct with the consumer, and therefore we need no trade classification to guide us. In the case of others our channels of distribution run through the dealer only; and we again have little need of trade classification just now. In the case of still others, who sell to jobbers as well as to dealers, a certain problem faces us of which we must find a solution sooner or later if we are to keep business running smoothly and keep pace with the natural development of our industry.

For the time being I see no way out except for each individual to study his own particular problem, keeping in mind that conditions are "as they are" and not always as we would like them to be. In other words, we must remain practical rather than theoretical no matter how idealistic our views may be.

When a sufficient number of us as individuals think that we need help on the proposition a committee can be appointed for this purpose. Whether the time is ripe now for such a committee or not is, of course, a matter for you to determine. Such a committee, if and when appointed, should consist of men who are in sympathy with the subject; men who are capable of handling it; men who are willing to devote to it the time necessary for the task. This committee, besides trade classification, will also have to consider other phases of policy such as quantity of differentials, extra charges for silver and other finishes, package charges, cash discounts and kindred items which have a bearing on trade relations.

Practical Designs Essential to Fixture Industry

E. T. Caldwell Proposes that Manufacturers Induce Students of Industrial Designing to Enter Shop and Lay the Foundation for Practical Production of Better Patterns of Lighting Fixtures

By V. D. GREEN

Director Publicity, National Council Lighting Fixture Manufacturers.

"A beautiful creation," said the designer as he contemplated the drawing on the board before him. "Great stuff," said the salesman. "We can sell 'em in thousands. Those gracefully curved arms and the ornamental scroll work are O. K."

But what Bill Jones, the shop foreman, thought about that fixture was different—and much less complimentary. "How in h—l is anyone going to get enough wires for multiple switching through that thin center tube," he asked indignantly. "How are two wires to be got through those twisted-looking bracket arms without stripping the insulation off them? Why on earth didn't they specify the tube so we could use the canopies from that big stock we have on hand? Didn't the designer know that we're liable to double our scrap percentage if we try to cast brass ornaments in that shape?"—and so on. Perhaps this is an exaggerated case but, honestly now, doesn't it sometimes happen even in the best regulated lighting fixture plant?

It would seem to be an inevitable conclusion that we have not yet realized the advantages of co-operation—so thoroughly exemplified by the rapid rise of the lighting fixture industry into prominence, and by the recent highly successful Fixture Market and Joint Convention of the lighting fixture industry at Buffalo—are just as great in proportion in our own works as in the greater world outside. And this co-operation we must and should have. The question of the training of designers in the practical details which govern production of manufactured articles in large quantities is one which may well commence with the training of art students into a practical appreciation of such items as the relative waste of false core casting as compared with ordinary molding; the undesirability of wire-wings which crowd the wires and tend to strip the insulation, and other details which arouse the ire of the men who have to translate the drawings into the actual fixture. In this connection it is interesting to note the paper read before one of the meetings of the National Council of Lighting Fixture Manufacturers by E. T. Caldwell.

"In the fall of 1920," said Mr. Caldwell, "the head of one of the companies engaged in the manufacturing end of our industry was requested by the trustee of a large technical school to permit one of the classes in industrial design to inspect his plant. Permission was very willingly given and a short time later the class of perhaps 12 to 15 young men and women, appeared at the factory, accompanied by the head of the school's department of design."

As Mr. Caldwell related it, the professor had conceived a really vital idea. Instead of allowing his pupils merely to draw pretty pictures on paper, he was determined that they should have some definite ideas as to how those same pretty pictures should be translated into actual objects of use. In other words, he wanted these young people to see "how the wheels went round," and how things were actually done.

Now, this group of students spent only 2 hrs. or thereabouts in going over the factory, taking in such various processes of metal working as casting, spinning, forging, lathe, work, plating, polishing, etc., in that short time, but they were interested and eager, watching and listening to everything put before them. They asked countless questions and when they left there is no doubt but the visit had stimulated their minds. They seemed to have awakened to the fact that in industrial designing under modern conditions the cost of production is one of the most important factors. This was a great step forward.

The average young man or woman starting out on a career of designing begins with the idea that if the objects they create are beautiful, that is enough. They do not seem to realize that in order to help in making the world beautiful they must make something which can be produced at a cost which the average person can afford to pay.

Men of experience in manufacturing all realize that what these young people could learn of the various processes of working in metals in the short time they spent in this factory could be of little practical good to them. But at the end of their visit this class had learned that false core casting is more expensive than plain casting; they realized that the forging of iron is a process involving much labor and that the wages paid for that labor have a direct bearing on the saleability of the article. They were young, American and willing to learn and they readily grasped such facts. There is considerable food for thought in the more or less unimportant happenings above described.

Practical Designs Lacking in Lighting Fixture Industry.

"We represent a great industry which bears the burden of responsibility for a large share of the physical and aesthetic welfare of the country," said Mr. Caldwell. "In cash investments we represent good many millions of dollars; in manufacturing processes we can hold up our heads with the big industries of our country; in salesmanship we are abreast of the times, and the

merchandising methods of some of our members set a highwater mark in commerce. But—in ideas of design we are self-confessedly lacking.

"So deficient are we that many of us simply wait for one of our competitors to evolve a new design, then pounce upon and reproduce it. This condition is not due to the fact that the men engaged in our industry are basically dishonest, but because there are not enough ideas to go around. To attract new ideas in design toward our industry as a magnet draws iron, should be our objective. It is the only way in which we can get rid of the question of piracy.

"Throughout the United States are trade and technical schools whose students are eagerly seeking an education in the principles of designing, hoping eventually to put that education to practical use. It would be a very simple matter for the lighting fixture manufacturers to communicate with the heads of their local schools and invite the class in design to inspect their factories and showrooms. It is safe to say that any invitation of this kind would be accepted with enthusiasm by both the pupils and the teacher. It would be a very little trouble to the manufacturer compared to the benefits that would eventually result. It would be only a question of devoting any 2 hrs. of a morning or afternoon to this purpose three or four times a year. Only 8 hours a year for each manufacturer, but think of the results that may be gained if each of us does his bit.

"The service to the public would be far from unimportant as the younger generation would be shown at the outset that a designer must have a knowledge of factory processes if his work is to be of practical and commercial value. Consider how many with real artistic talent are handicapped by being educated only from the aesthetic viewpoint. Consider how the country as a whole would benefit if those studying designing could be made to realize the necessity for a knowledge of the practical end of their art. A good design will sell better than a poor design; one can trust the good taste of the country for that; but, all things being equal, a bad design that is cheap will sell better than a good design that is too costly for the purpose for which it was intended. So, if we can show the designers a little of the dollars-and-cents side of the vocation we will be doing them and the public a service and eventually reap dividends for ourselves.

"The average student of design seems to regard lighting fixtures as an extraneous growth on the walls and ceilings. Furniture, hangings, silver, china and similar things interest and inspire him with a desire to make something new and beautiful; but lighting fixtures seem to be correlated in his or her mind with the furnace, the laundry tubs or the gas meter as far as stimulating interest is concerned.

"If each of us were to make an object to bring these young people, whose interest in designing is shown by their desire for an education in that line, to a realization of the importance of our industry and the splendid opportunities it opens to them for success in their chosen vocation, we would be doing something that would greatly benefit our own industry.

"We need designers. During the period after the war, when labor troubles were rampant and help was scarce, we all got together and *made* polishers, chasers, etc. We are facing the same conditions now in regard to designing. Let us use every means at our command to interest the younger generation in our industry, to bring new designs into the trade and to stimulate the development of ideas. In this way we will overcome the paucity of ideas and dearth of designs which seem to be the cause of piracy. Even admitting there may be some difficulties in the way of carrying out this idea on a sufficiently extensive scale, are there not far more difficulties in the way of trusting to chance for our supply of practical designers? Surely there are.

"Carrying this matter a stage further, why should not the designer be compelled by custom to have a practical knowledge of manufacturing processes before he can qualify as a designer? Did one ever hear of a designer of electric motors, for instance, who had not had at least a few months' practical work in the assembling and winding departments? Did one ever discover a locomotive-designer who had not worked on the actual construction of boilers? Let us admit that an impractical design of boiler may result in danger to life while an unpractical fixture design merely means a loss of money for the firm which makes it—but even so, the principle of insisting on practical training is just as necessary to the designer of one as it is to the designer of the other.

Actual Shop Experience Essential to Student Designer.

"Let us arrange to give our embryo designers the practical experience of actual manufacturing conditions which is essential if we are to reduce our costs to the figure they ought to be. The young art student who wished to take up lighting fixture design would thus be compelled to graduate in his new employment by donning overalls and making the articles he will later have to design.

"It may be that the young art student will object. He may argue that the artistic feeling would be blunted by rough experience of the shops. He may even go so far as to say 'He'll be d—d first.' But, most of the great artists of former times were not only artistic designers but good mechanics also. In fact, it amounts to this: If an art student really wants to make good as a designer, or anything else, there are not enough obstacles in the world to prevent him from doing so.

"It may be said the fixture industry is now sufficiently rich to stand the cost of such an experiment. But it probably would not cost any more than our present method of training designers by gradual education in the requirements of lighting-fixture design. In fact it would probably cost less. A mistake in the design department is apt to cause a lot more trouble than a mistake on one particular operation in the shops.

"There is yet another step which could be taken. Manufacturing conditions tend to change with the invention of new and improved machinery. The designer cannot be expected to keep up with every development of the kind, though his previous shop training will naturally make him much more interested in it than would otherwise be the case. Therefore, it would seem

advisable before the design is put through on a production basis that a conference between the designer, the sales-manager and shop superintendent should be arranged. Each of these three is vitally interested in the details of the design. Although each looks at it from a different standpoint the co-operation of all three is vitally interested in the details of the design and is necessary to insure the success of a fixture. Moreover, each will have had an opportunity to discuss and approve it. Harmony is just as necessary in the manufacturing plant as it is in the fixture itself."

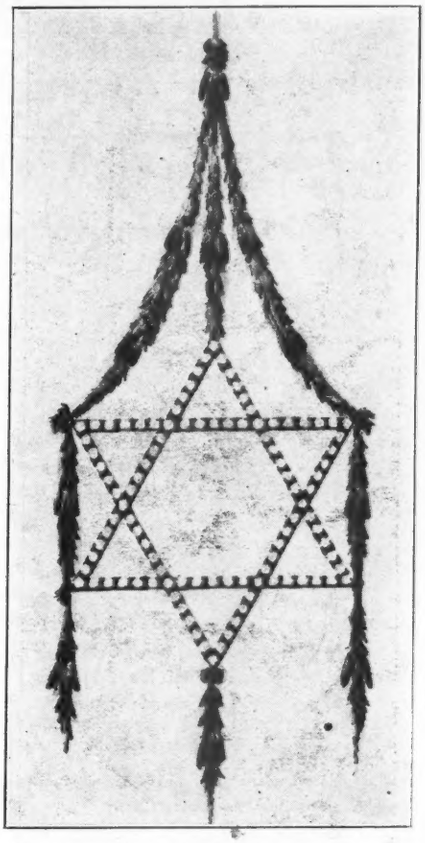
SPECIAL ILLUMINATION PLANNED AS CONVENTION FEATURE.

Searchlights, Festoons, Arches and Screens to Be Used in Decorating Des Moines to Welcome Guests at Shriners' Gathering.

Elaborate lighting is being planned for the 47th annual meeting of the Imperial Council, Ancient Arabic Order, Nobles of the Mystic Shrine, which will be held in Des Moines, Ia., June 14-16. The plans which have been worked out under the direction of W. D'A. Ryan, director of the Illuminating Laboratory of the General Electric Co., include as the principal features a large illuminated "Arch of Welcome," an "Arabian Court" and the roofing over of a bridge with festoons of colored lights giving it the appearance of a series of tents.

At the end of the Arabian Court will be placed a large screen displaying Shrine emblems and decorated with Novagem jewels, which will be illuminated by 18-in. d-c. arc searchlights. Steam effects will also be employed. Overhead decorative fixtures will be used and the street between the Arch of Welcome and the Court will be decorated with festoons of red, green and yellow 10-watt lamps placed on 18-in. centers. A set of 7-pointed stars made of wood strips equipped with cleat sockets and 50-watt multiple white glass lamps, the whole edged with jewels, will be suspended over the center of the street at street intersections and midway of the longer blocks.

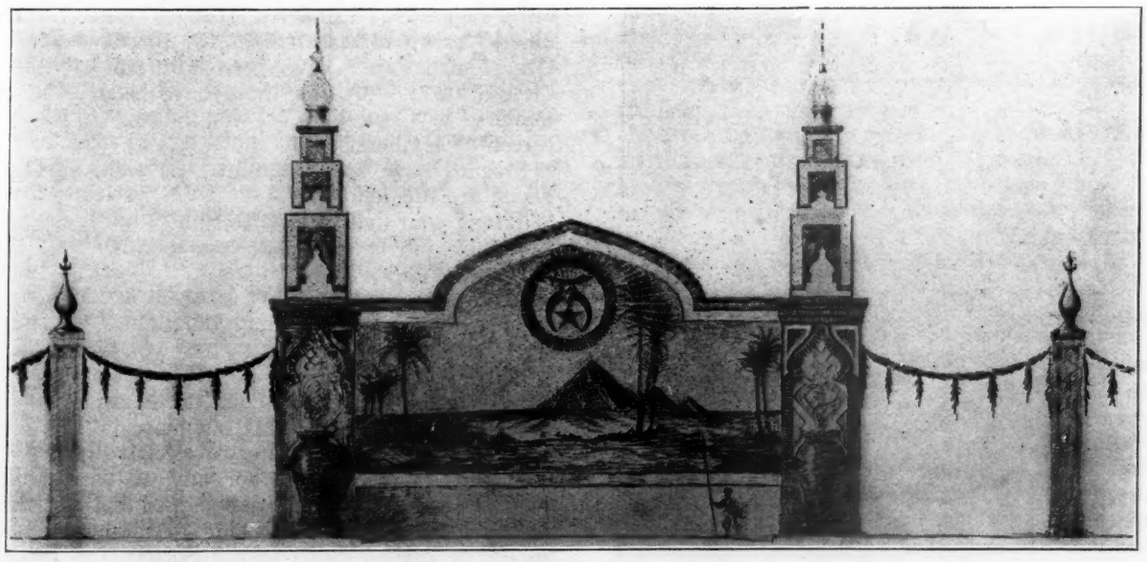
For the lighting and decorative treatment of the bridge where dancing will take place the bridge will be divided into five sections, each of which will be treated as a separate unit. Festoons of



Overhead Decoration for Installation Over Streets Along Line of March.

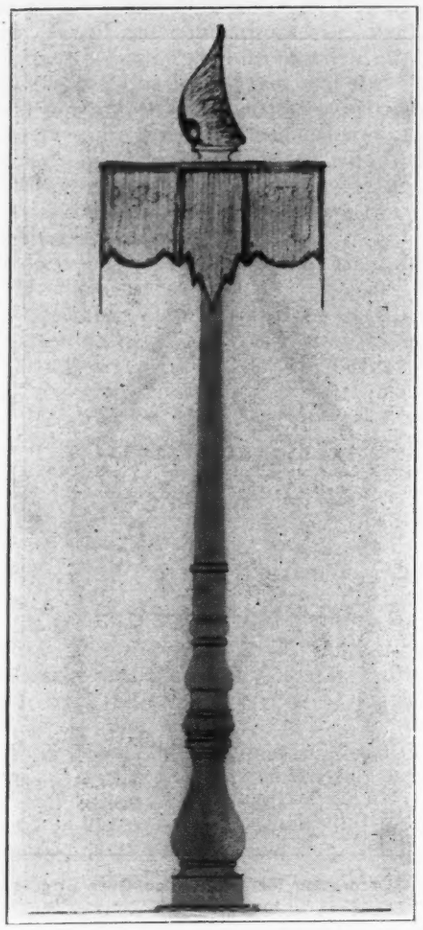
10-watt red, green and yellow lamps alternating with fezzes, emblematic of the Shrine, will be draped from 30-ft. poles in the center to 12-ft. poles fastened to the sides of the bridge, the whole giving the appearance of a series of huge tents roofed over with lines of dazzling colored light.

To supplement the lighting along the line of



Illuminated Screen to be Placed at End of "Arabian Way."

march of the parade outside the business district where the lighting is not sufficient, a standard fixture such as the radial-wave reflector or similar



Shield for Street Standard for Use in Business District.

type will be used. The decorative feature will be obtained by adding a skirt to eliminate the glare and bunting streamers to give colored and festival effect. These fixtures will be equipped with 300- or 500-watt multitple, or 250- or 400-candle-power series type C lamps and supported on trolley span wires. Throughout the business district the top lamps at street corners will be replaced by lamps of larger capacity—300 or 500 watts—and covered by a papier mache or plaster shell, while decorative shields made of a wooden frame work covered with painted fabric will surround the lower lights. Between the street corners the same arrangement will prevail, except that there will be no shields for the lower lamps and the lamps will be colored red, green and yellow. Flood lights will be used to illuminate the state capitol and the courthouse.

"Arch of Welcome" to be Erected in Des Moines, Iowa.

NAME WANTED FOR REMOVABLE LIGHTING FIXTURE.

The advent of the removable lighting unit calls for a new name, one which should be more appropriately descriptive than the often abused term "fixture" by which the ceiling and wall lights have heretofore been known. A fixture, as defined by Webster, is something fastened in place or, in law, an article affixed to the freehold and consequently confined to one place. No qualification of this word "fixture" can make it serve as an appropriate term to apply to the new lighting units, for its use would signify permanency.

"Chandelier" will immediately suggest itself. This is a word derived from the noun "chandler," signifying a dealer in candles, oil, soap, paint and groceries, and was used to designate the first lighting unit of which there is any mention, the 7-branch *lumiere* of antiquity. Early French historians classified chandeliers as *chandeliers mobile* (movable units), *chandeliers suspendus* (hanging units), and *chandeliers fixes* (fixtures). Reference is also made that the princes and gentlefolk had to have *lumieres* that they could transport from their chateaux to the city, or from the city to the country. That need introduced small metal lamps fashioned so they could be carried from place to place. *Chandeliers suspendus* developed into *lumieres* and *lustres, candelabra* and *girandoles*. The wall bracket of today evolved from *appliques*. *Lanternes, portatives* or *vivantes,* became in time our modern lanterns.

These few references to lighting units of old have suggested "Lumieres Mobiles" and "Mobiliers" as appropriate names for the new units. Other suggestions have been "Portaliers" and "Removaliers." A few more have been: "Luminiers," "Chatteliers," "Chattelites," "Elextures," "Elexiliers."

Slogans have been submitted, as well, among which are the following:

"Hang your light where it's right."
"Move your lights to suit your moods."
"Light Right with Right Light."
"Hang your lights—don't fix them."
"Place your outlets—hang your lights."
"Portoliers may be placed where you please."
"Your lighting is the mirror of your home."
"Luxury in light is in choice not in price."
"Place your light to light your place."
"Elexiliers are the essence of electric lighting."

It is questionable whether any of these will find general favor, so it is to be hoped that further suggestions will be forthcoming. All suggestions should be mailed direct to the Society for Electrical Development, 522 Fifth avenue, New York.

Co-operation Between Architects and Fixture Men

New York Architects' Committee Report on Advantages of Proposed Change in Method of Letting Lighting Fixture Contracts Earns Favorable Comment by Official of Manufacturing Concern

Recently "Electrical Review" received a copy of a report made by a committee of architects, embodied in a bulletin issued by the Investigating Committees of Architects and Engineers of New York City. This report, a reprint of which is a part of this article, was submitted to Charles F. Kinsman, of the Sterling Bronze Co., New York City, with a request for an opinion thereon. Mr. Kinsman's opinion, in the form of a communication, is given below.

Editor ELECTRICAL REVIEW:

Your representative was kind enough to call upon us in the writer's absence from the city with reference to the bulletin which has been published by a Committee of Architects on the advantages of a change in the method of awarding lighting fixture contracts.

It seems to us that this is a very splendid thought and a big idea which, if adopted by the profession, would be a step in the right direction and produce for their clients, for themselves and for the manufacturer very superior results. It would at once put the manufacturer in a position to give not only service and quality, but to merit in design, scale, color and craftsmanship, and where the manufacturer failed in any of these particulars to satisfy the architect or the client he should no longer enjoy the patronage of such an architect.

By the present custom of bidding in competition we have observed that all that interests the client in any building project today is price. We feel that the lowest offer can be made by the best manufacturers if their overhead could be materially reduced and by the method proposed in this bulletin many unnecessary expenses could be eliminated and all concerned would benefit. We think that the profession generally, especially those of wide experience, will admit that there are two items in every building project which call for design and merit in decoration that should not be competitive. One is special hardware and the other is lighting fixtures.

The manufacturer who is admittedly sincere but incapable of executing work of the character so much in demand in important locations, may employ the highest class of designer and, therefore, win the contracts on merit of design, but what follows in the delivery of the merchandise is shown in the atrocious results that appear in many public buildings throughout the country, especially the U. S. Post Office buildings.

In addition to the above reason we might add that the present custom is to lay aside the question of fixtures until the last minute, at which time in most building projects the commercial contractors, such as the plumber, electrician, plasterer, tile man and mason, have secured so many extras that anything contemplated for fixtures has long since been wiped out and, therefore, there is little or no money allowed for fixtures. Moreover, there is a continuous flow of salesmen representing the many lighting fixture dealers constantly annoying the owner or the architect for an opportunity to estimate for the fixtures and if they are not given such an opportunity then there is a general cry of unfairness on the part of the architect.

There are in our judgment many other reasons why the present general custom of taking up the fixture problem of most all buildings should be changed. We most heartily approve the suggestion made in the bulletin, which we are pleased to return herewith.

(Signed) STERLING BRONZE CO.,
By Charles F. Kinsman.

PROPOSED CHANGE IN METHOD OF AWARDING FIXTURE CONTRACTS.

Following is the report of a committee of architects to the Investigating Committees of Architects and Engineers, of New York City, on the "Advantages of a Change in the Methods of Awarding Lighting Fixture Contracts," as embodied in a bulletin prepared and copyrighted by R. M. Hooker, general secretary:

"Most architects feel that the competitive system has been carried to an extreme and that it is largely responsible for the decadence—so keenly felt by architects—in the pride of craftsmanship. Unless the craftsman is imbued with the spirit of the design, he will fail in executing the work in such a way as to realize its artistic possibilities. If the price at which work is taken compels the use of a stop-watch on the artisan he cannot be expected to give much intelligent thought or careful labor to its execution.

"The manufacturer and his workmen must feel an honest pride in the completed work if the architect is to give the client the artistic value for which he is being paid. It is supposed that the owner retains an architect for the purpose of securing a building properly planned to meet all practical needs and of true artistic merit, and not to get a cheap building that is not too atrociously ugly.

"Architects are realizing more and more that they cannot get results in specifying structural materials and mechanical devices by naming several of varying values and leaving the whole thing open by the addition of "or equal." If in these matters careful specification and care to prevent unrestrained competition is found necessary, what can be expected from the present competitive system as applied to the decorative features such as sculpture, mural decorations, special hardware,

ornamental bronze and iron work, modeling, carving, lighting fixtures, etc.

"The preceding statements may be trite but the fact remains that abuses of the competitive system thwart the architect in his endeavor to realize his ideals.

"This Committee has investigated the disadvantages of the present competitive method as now applied to lighting fixtures, and offers a substitute, which it thinks has many advantages.

"Why not let the contract for the lighting fixtures at the same time that the other contracts are let? This would mean selecting a manufacturer in whom the architect has confidence, explaining as nearly as possible the general character and design of the fixtures which will be wanted, their environment, and particularly the important locations, and asking him to submit an estimate, attaching thereto photographs or tentative drawings. If he is worthy of confidence his price will be right and can be included in the budget and the contract awarded to him.

"This will eliminate competition on the particular project but the manufacturer will know that he must satisfy the architect in every respect if he is to be selected again. This knowledge will be an incentive to encourage interested skill on the part of his designers and artisans instead of dampening their ardor for fear that they will consume more time than he dared to allow for when competing for the job; oftentimes with men having less interest in the successful issue of the work than in the net profit.

"At first thought it might seem that this would assure a higher estimate than would be secured by the present competitive method, but it is the opinion of this Committee that it should not and would not. This opinion is based on the saving to the manufacturer of expensive solicitation, of the cost of preparing designs and estimates for four jobs which he fails to get, to the one which he does get.

"At the request of this Committee, a committee of the New York Division of the National Council of Lighting Fixture Manufacturers went over their books and estimated that there would be a substantial saving in their overhead by this method. This saving, if given to the owner in artistic interest, both in design and craftsmanship, might easily mean the difference between fulfilled ideals and disappointed hopes.

"There is also an ethical side to the question. Is it fair to ask competitive bids simply for the purpose of checking up the estimate of the man to whom it may be predetermined that the work will go?

"Official report was signed by the above Committee Feb. 23, 1921.

"Franklin H. Keese, Director of Investigations; Ralph Moreton Hooker, Secretary."

Note.—Our committees serve without compensation, and are absolutely unbiased. The object is the promotion of "Better Building." The names of the members of this committee will be furnished any architect or engineer upon application to R. M. Hooker, Box 72, Wall Street Station, New York City.

GLASGOW SOLVES THE PROBLEM OF PERPETUAL MOTION.

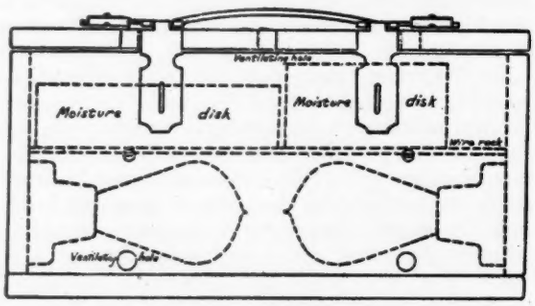
Folks who believe hustle and bustle in everyday life is a characteristic confined strictly to the Western Hemisphere would do well to visit Glasgow, according to J. H. Bell, a Western Electric engineer, who recently returned from a tour of investigation of the utilities of Europe. "In all the time I was in the busy Scotch metropolis" he states, "I never saw a streetcar stop at any but few stipulated stations. At all other places, the motorman merely reduces the speed of his vehicle when he is hailed by a prospective fare and the latter makes his ascent to the platform on the fly. Men and women, young and old, have become so used to mounting the cars while they are in movement that the latter seem to be in a state of perpetual motion at all times."

A PORTABLE ELECTRIC DRIER FOR DRYING-KILN SAMPLES.

Heat From Carbon-Filament Lamps Used to Evaporate Moisture in Wood Disks While They Are Undergoing Test Process.

The Forest Products Laboratory of the U. S. Forest Service, Madison, Wis., has devised a portable electric drier for drying moisture-determination disks. It consists of a sheet-iron box 4 in. by 13 in. by 6.75 in. in dimensions, lined with a layer of asbestos 0.5 in. thick. The heat for drying is supplied by two 40-watt carbon-filament lamps placed in the bottom of the box. Immediately above these lamps is a wire screen on which the disks to be dried are placed. Ventilation is obtained by 11 holes 3/8 in. diam., six of which are in the cover, three in the back near the bottom, and two in the front. A cord and plug attached to the drier make it possible to connect it to a lamp socket.

Inch disks are easily dried in this apparatus in 24 hrs. The maximum temperature attained is



Portable Equipment Used to Evaporate Moisture From Wood Samples.

230 deg. F., which is reached only if the disks are allowed to remain in the drier for several hours after they are bone-dry. A slight scorching of the disks occurs under these conditions, but for all practical purposes this does not cause any appreciable error in the moisture calculations.

The weight lost by the disk in drying is the weight of the moisture that was in it. This weight divided by the weight of the dry disk times 100 gives the percentage of moisture in the stock in the kiln at the time the sample was removed. Such a drier is very well adapted to commercial practice. It can be carried around the plant and used in any place where a suitable outlet is available. It may be enlarged by increasing the width and the number of lamps.

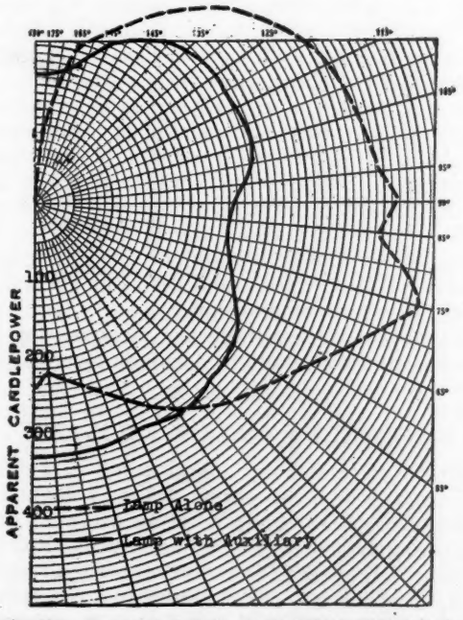
Lighting Requirements in Modern Dining Room

Properly Directed Light from Ornamental Unit Produces Pleasing Conditions of Comfort and Ease—Results of Special Study Shown

By F. W. MATHIEU
Mitchell Vance Co., New York City.

Each room in the home has its special requirements in furniture, furnishings and decorations, and the light and lighting equipment play no minor part in bringing out the best that is to be had in the enjoyment of the room and its equipment. The dining room is no exception to this rule, and, if anything, its requirements are more exacting than those of most other places in the home. The dinner, and so the enjoyment of the evening, can be completely ruined by the irrelation of bad lighting, or just the opposite results may be secured by providing a pleasing and homelike glow in which to enjoy a well prepared spread.

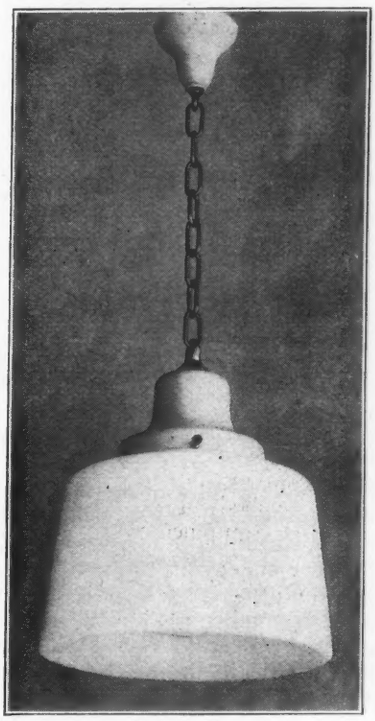
The problem of properly lighting the dining room has been so difficult of solution and has been approached from so many different angles that the result has often been to confuse rather than to enlighten. Every hostess is alive to the importance of having each minute detail of a dinner carefully considered. Success or failure depends not only upon the excellence of the preparation and the service, but also upon the artistic appearance of the table, the genial atmosphere of the



Illumination Curve for Plain Unit With 300-Watt Lamp.

room, and the charm of sparkling conversation. All these in turn are dependent upon the psychological effect of illumination.

Light has the power to enliven or depress, to create irritation or repose. It is, therefore, a powerful agent and its use should be determined by an exact knowledge of what is required and not left to chance as is unfortunately more often the case. It is obvious that the greater volume of light should be diffused directly upon the dining table. The quality of the light must be such that it is pleasing to the eye, that it avoids all sugges-



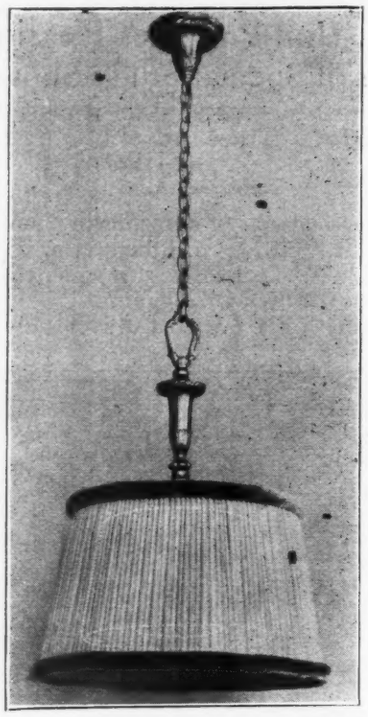
T. R. B. Plain Lighting Unit.

tion of glare, and at the same time sheds a cheerful radiance over the table and its setting. The color of this light is of the utmost importance; it should be a pure white of daylight quality in order that the tablecloth, silver, glassware and china shall appear to the best advantage.

Light directly in the line of vision should be greatly subdued and so modified as to provide a charming glow of color upon the guests. The light directed to the ceiling should be a diffused light—that is not over brilliant, bust just sufficient to provide general illumination.

The mechanical features of a fixture to produce such results are very important and, therefore, should be seriously considered. It should be so constructed as to permit of ease in cleaning, and so should not be an open receptacle in which dust and dirt can accumulate. The lamp bulb should be totally inclosed in a globe, preferably glass, of correct construction and shape so that the light

rays will be properly directed and diffused in the varying intensities necessary on the different planes. Where a silk shade is used it should be easily removable to allow for the substitution of a cretonne shade or shade of similar material for use in summer, or for the purpose of matching



T. R. B. Lighting Unit With Shade and Suspension for Dining Room.

the draperies and other hangings in the room during this period.

An accompanying illustration shows a dining-room fixture embodying the various features essential to such equipment. Another illustration shows a fixture employing the same type of distributing and diffusing glassware, but intended for other service and so not having the silk shade and ornamental suspension. Regarding the unit without the silk shade, the following distinct features are worthy of careful consideration: The flat wide top creates a softly diffused light over a wide area on the ceiling without the presence of shadows or light rings; the large flat surface in conical form creates low intrinsic brilliancy and gives softly diffused light to the walls; the angular inward under portion in low brilliancy avoids glare and helps to distribute light over a wide area; the convex center, or bulls-eye, in the under part concentrates and distributes the maximum illumination over the working plane, and the downward light by reflection from various planes inside of the globe helps to create additional diffused light below the unit.

Due to the particular construction of the glass, which is the famous Celestialite glass made in special "T. R. B." density, it is possible to do delicate work with the same precision and certainty as in actual daylight without injury to the eyes. An idea may be gained of the light distribution from this unit by examining the illumination curve. This curve represents the performance of the plain unit only, but gives an idea of what might be secured with silk or other shades added. Dining room fixtures are arranged for lamp sizes of 75 to 150 watts. By selecting different colors and materials the shade may be made to produce a variety of effects and tones suitable to the fancy of the mistress of the dining room.

AMERICAN ELECTRICAL TALENT IS WANTED IN ALBANIA.

Plea Is Made Through Red Cross Representative for an Engineer or Company to Undertake Development of Water-Power Project.

It is a long cry from Argirocastre, Albania, to the United States, but natives of that ancient and picturesque city have issued an appeal for some enterprising engineer of America to help them out of a serious predicament. The 12,000 people who live in that "golden city" of the east are faced with a shortage of kerosene for lighting their houses. During the last few months the oil which was usually gotten from Santa Quaranto, 50 mi. away, has been diverted to other markets where better prices are to be gotten.

Stern measures of oil economy were taken by the city council but the problem of lighting still remained. Kol Tromara, the Prefect, who spent 12 yrs. of his life in Boston, U. S. A., has issued an appeal for an American engineer or electrical company to build a power plant on the banks of the Zrinos river, 10 mi. away, big enough to furnish electricity to turn the wheels of every industry in the fertile Albanian valley.

"We have the money in gold Napoleons," Kol Tromara declared to an American Red Cross man who visited the city in connection with the relief work in the Tepelena earthquake district, "but we lack the organizers and the salesmen to get together a company that would furnish the necessary machinery. About 10 mi. from this city is a stream with a natural fall of 200 ft. straight down a bank to the Zrinos river. Summer and winter this stream flows with the same volume—enough water to furnish hundreds of horsepower.

"What we want, and what we need, is an American electrical company to install such a plant and lead us from the wilderness of kerosene lamps and gasoline engines. I know that if any of the big companies of America would be interested they would solve our problem and earn our great love as well as great compensation."

It is estimated that there are 2,000,000 hp. of undeveloped waterpower in Albanian rivers.

ENGINEERS VALUE UTILITY.

Ford, Bacon & Davis, engineers, New York City, engaged by the Street Railway Valuation Commission of Trenton, N. J., to make a report on the properties of the Public Service Railway Co., have tendered their report, showing a valuation of $125,000,000 for the electric street-railway system in the state employed for public convenience. The property of the Trenton & Mercer County Traction Corp. is valued at $5,000,000 by the engineers. The figure of the first noted company is $60,000,000 more than estimated by the different municipalities, and $25,000,000 less than computed by the company itself. The franchise rights are held to have no value in the report.

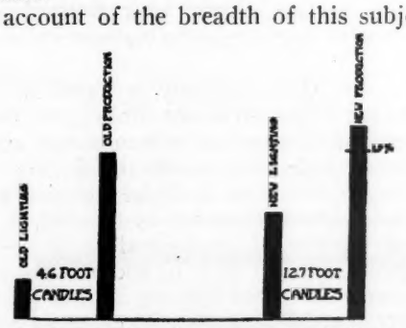
Safety Features of Industrial Lighting

Production Speed and Elimination of Dangers to Employes Are Chief Factors Possible With Proper Illumination in Factories—Unshielded Lamps Produce Eyestrain and Resultant Diseases

By SAMUEL G. HIBBEN
Illuminating Engineer, Westinghouse Lamp Co.

Passage of the New York State Code relating to the lighting of factories and mercantile establishments brought us face to face with a new safety factor—illumination. This is one of the least understood yet most vital subjects that have to do with economic humane employment and development of labor, and as our knowledge of better lighting increases our appreciation of its influence on industrial operation increases in proportion. In discussing industrial-lighting fixture equipment, and particularly its maintenance, we have entered upon an argument disclosing much that is vital in the accomplishment of all three of the desiderata of successful industrial operation—production, speed and safety. And since production depends upon the other two, or since all three are really synonymous, any arguments applying to the maintenance of a grade of illumination satisfactory for safety will apply equally well to the others.

On account of the breadth of this subject we



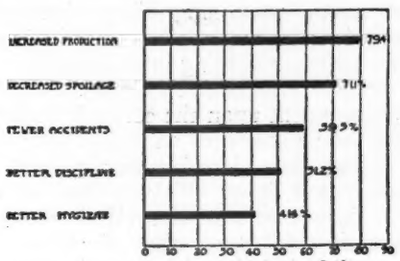
Better Lighting Increases Production.

shall not attempt to describe the various types of lighting fixtures on the market, nor indicate of what a satisfactory lighting installation consists. One may say in general that good or bad lighting depends upon two outstanding factors. Bare incandescent lamps, or unshielded glaring illuminants that not only do not illuminate, but cause a contraction of the pupillary opening of the eye and resultant decrease in seeing ability form one of these factors. More or larger bare lamps only aggravate this trouble and increase the hazard; the solution is found in the proper use of a good reflector, or a shielding fixture.

The second factor is the matter of insufficient light and this is very largely influenced by lamp renewals, reflector and lamp cleaning and the colors of surroundings or whatever would be involved in maintaining the original installation up to its initial efficiency. It is this very important phase of applied illuminating engineerng that will be discussed herein.

Results of Insufficient Illumination Upon Industrial Employes.

Insufficient illumination unquestionably reduces visual acuity, decreases the speed of muscular ac-

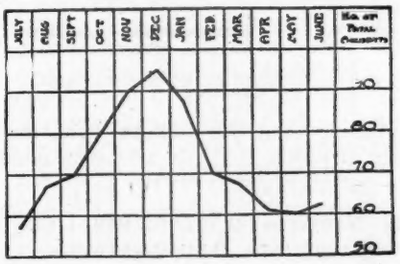


How Manufacturers Regard Lighting.

tion, confuses the mind and leads to accidents. A few figures will illustrate this point.

In the coal industry, for example, we think of coal mine accidents as resulting mostly from falling slate or gas explosion, whereas statistics show that for each 1000 men employed underground there are 11 serious or fatal accidents a year, and for the same number of employes working above ground there are five serious accidents per year. In very few industries is the illumination so wretched either above or below ground, and this largely explains why we find the abnormally high accident rate in both places. The five accidents that occur uninfluenced by underground hazards can be almost altogether attributed to either poor natural or poor artificial light, and doubtless more than one-third of the underground accidents arise from the same or a greater insufficiency of light.

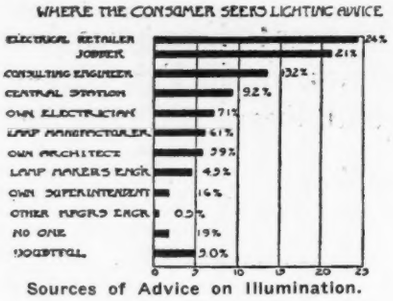
As another feature of the close relation between light, speed and safety we can cite the example of the tennis ball, which may be perfectly visible to



Seasonal Variation of Fatal Accidents.

each tennis player when held in the hand just before serving but which, when in rapid motion in the air, is almost invisible if the daylight be weak. Any rapidly moving object must register its image

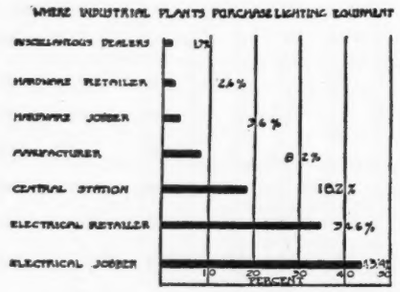
upon the brain before we *see* it and, as in the photography of objects, there must in human vision be sufficient illumination of that object before our eyes—our human motion-picture cameras—will record a clear impression of it. Muscular action cannot begin until after our brains have



Sources of Advice on Illumination.

"developed the film" and, hence, our speeding up of action either to produce or to protect must first start with an understanding of the time-element of vision and an endeavor to reduce this time to a minimum by higher lighting intensities.

Granting, for a moment, that good illumination is largely dependent upon the care of the lighting equipment, let us see what valuation may be put on poor maintenance; in other words, what is the high cost of poor light? Figures that in general agree with insurance statistics (if they err, it is upon the safe side) show that the total annual serious accidents in industrial plants in the United States amount to 25,000 per year. This is the minimum figure. Out of this 25,000 there are 15% chargeable to poor illumination—either unshielded, poorly directed light or insufficient light. Now, based upon the average amount of employe's compensation paid the equivalent lost time of each serious or fatal accident traceable to faulty illumination is 850 wks., or the total annual time lost is over 3,000,000 wks.—roughly equivalent to the working life times of 1000 men. If these men were earning $25 per wk., then practically $80,000,000 in wages are lost annually through improper lighting. If there be added to



Industrial Lighting Equipment Sales.

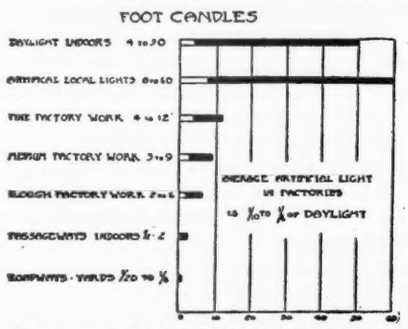
this staggering sum the doctors' bills, medicines and losses of production, we arrive at astonishing figures.

Greater Number of Accidents Due to Inadequate Illumination.

One does not often think about the fact that the intensities of artificial light in industrial plants are much below the daylight intensities. We find daylight in factories running from 4 to approximately 50 foot-candles. General, artificial lighting in factories for even fine factory work has this year been in the range from 4 to 12 foot-candles, for medium factory work between 3 and 9 foot-candles, and sometimes down to 0.50 or 0.25 foot-candles for indoor passageways. Places like stairways and the positions where accidents are the most prevalent are usually most poorly lighted, and if daylight conditions here were reproduced even in the most meager way we could reduce accidents materially—statistics show that the largest majority of accidents occur in the night shifts. The percentage is about two to one—two accidents under artificial lighting compared to one accident under daylight conditions.

How do the manufacturers regard good lighting? Increased production, 79% of the manufacturers say, is their excuse for good lighting. Decreased spoilage, 71% say, is their reason, and 59% of the manufacturers say that fewer accidents constitute their reason for good lighting, etc. Offhand the manufacturers admit without any argument at all that in half of the cases they would have fewer accidents if they had better illumination.

Now it has been shown that the total cost of


FOOT CANDLES
DAYLIGHT INDOORS 4 to 50
CRITICAL LOCAL LIGHTS 8 to 60
FINE FACTORY WORK 4 to 12
MEDIUM FACTORY WORK 3 to 9
ROUGH FACTORY WORK 2 to 6
PASSAGEWAYS INDOORS 1/2 to 2
AVERAGE ARTIFICIAL LIGHT IN FACTORIES
1/10 TO 1/4 OF DAYLIGHT
Average Artificial Light in Factories.

accidents, the total disability payments and the total lost time of industrial operators in the United States amount to more than the total cost of artificial illumination. We should ponder over that fact. The total cost of artificial illumination in the United States is exceeded by the cost of accidents and the loss of production resulting from poor lighting, and yet 59% of the manufacturers already agree that poor lighting is directly or indirectly responsible for these accidents. Surely, then, it is logical to preach the doctrine of improvement and the folly of inertia.

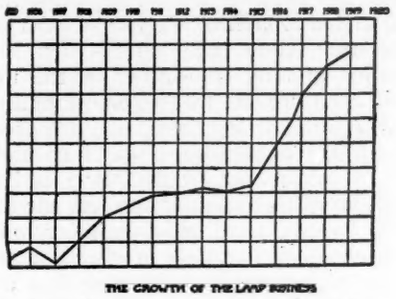
Majority of Casualties Occur During Periods of Short Days.

Data of reputable insurance companies prove that artificial lighting is connected in some way with accidents. In one class of labor during the months of July and August there occur out of a maximum of some 95 accidents, about 60. The rate rises in October, November and December, falling off in January, February and March as the days grow longer and coming down to a minimum again in May, June and August when daylight is at maximum.

This is not new information at all, but it adds weight to the argument that the fatal accidents or the serious accidents prevail in the darker seasons of the year. Other items such as poor ventilation, low temperatures, etc., undoubtedly enter into these figures, but in tropical latitudes nearly this same ratio is found to exist. Similarly, the ma-

jority of the accidents that do occur in the dark seasons occur when the daylight is insufficient.

Now, it can be shown how maintenance is responsible for good light, and, conversely, what poor light we will get when we do not consider maintenance. The first thing to do to get good illumination and to reduce the danger of industrial accidents is to look to the interior finish of the rooms or the factories. This is termed "Painting for Light." Ordinary white paint has a reflective value of, say, 82%. Consider the ceilings of a room that is finished in gray-white with a reflecting value of about 75%; then three-quarters of the light falling on the ceiling surface will be reflected. Now, if we were to neglect

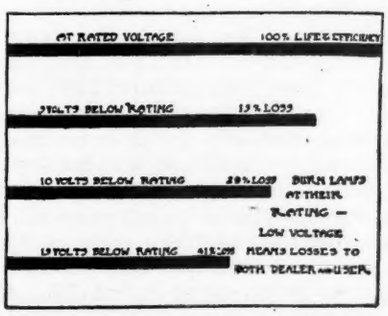


Growth of Incandescent Lamp Sales.

that fact, and were to paint our walls and ceiling medium gray, for instance, which would reflect 46% of the light, we have cut our available usable illumination practically in half. In the red and dark colors the reflection coefficients range in value to about 30%. Hence, one of the first things that will lead to better illumination and fewer accidents will be the attention given to the interior finishes of the buildings.

Importance of Maintaining Reflective Factor of Interior Finish.

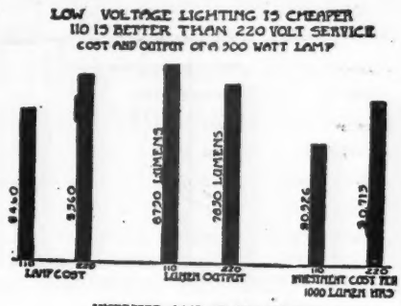
This question of light-colored interiors is very pertinent. Not only must one use light-colored paints to obtain high efficiency, but he must clean


AT RATED VOLTAGE
100% LIFE & EFFICIENCY
5 VOLTS BELOW RATING
13% LOSS
10 VOLTS BELOW RATING
29% LOSS
BURN LAMPS AT THEIR RATING — LOW VOLTAGE MEANS LOSSES TO BOTH DEALER AND USER.
15 VOLTS BELOW RATING

Use of Lamps at Proper Rating.

the paints or must maintain them. Some of us have worked a great deal in the steel-mill districts where perhaps the cheapest thing in the factory would be whitewash, and yet this is the rarest thing that one can find. One rarely sees a steel mill whitewashed, and yet the illumination of such a plant could frequently have been increased 20% by a coating of whitewash on the black walls. Large expanses of pure white surfaces directly before a workman's eyes are not advisable, as neither are unshaded windows, but a sensible use of both can produce remarkable improvements.

Cleaning is essential in maintaining lighting efficiency. When a typical reflector that has been in service several weeks is wiped its candlepower in a downward direction is increased from 1000 to approximately 1350 with corresponding increases in other direction, and when the unit is



Cost and Output of 500-Watt Lamp.

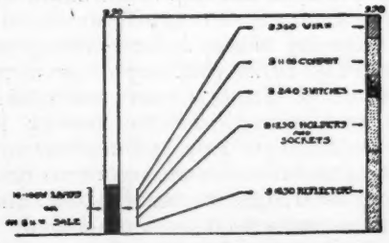
thoroughly washed with soapy water and ammonia its downward light is increased to about 1500 candlepower. Obviously, a neglected lighting fixture cannot properly perform its work, and the ones that show dirt are in many cases preferable to those that do not for the latter will probably be cleaned oftener.

Though some fixtures in industrial-plant lighting are affected more than others, yet all suffer so much that after 2 or 3 wks. the light output is reduced to 85% of its original amount, or less. With the inverted type of glass bowl, or the semi-indirect types, there is a still more astonishing condition. Merely a thorough washing results in 26% more usable illumination, and the cost of this cleaning as compared to the investment and operating expenses is very small, scarcely reaching 30% of the latter. The slogan, "Water is cheaper than Watts," might well be printed on the card of every efficiency expert.

Increased Efficiency Resulting From Frequently Cleaned Fixtures.

Comparing the depreciation of illumination in the office with that in the factory, we note that the factory units suffer more. This is reasonable because we find more dust and usually an oily dust in the atmosphere of the factory. In a very dirty building after 3 wks. of neglect the illumination may drop from 4.0 to 2.0 foot-candles, and the only reason why such depreciation is allowed to continue is because the reduction is so gradual and the effects are so insidious.

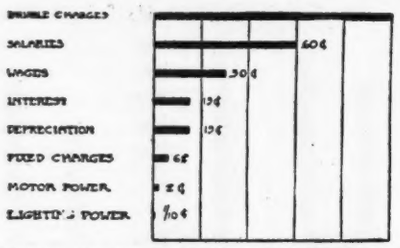
If we assume or admit that cleaning of lighting fixtures and of light-reflecting surroundings is essential to efficiency, then why don't we clean? Is the cost prohibitive? It cannot be considered so, in comparison to the results secured. In a typical large building having glass lighting reflectors and rather elaborate commercial fixtures



What Goes With Lamp Sales.

we find that out of a total annual operating cost of lighting equipment amounting to $14,438, the cleaning and maintenance is represented by $4633, or about 32%, which may be taken as a fair proportion.

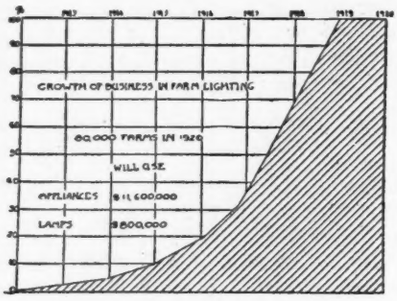
Expressed in the terms of an evaluation of the working man and his possible output, the cost of



Charges Per Hour Against a Machine Tool.

good lighting is perhaps 0.1 to 0.25%. If we can add to the workman's output, or eliminate lost time represented by not more than 2 min. per day, then the value of his output in that short space of time will equal his share of the cost of lighting for the entire day. Expenditures for oil are sometimes greater than for light—are we then evaluating the machine higher than the man?

In order to show what could be done with a neglected lighting installation, three factories were taken which had conditions that are found all too frequently. Case No. 1 was found with 2.6 foot-candles of average illumination intensity. Washing the units increased this illumination 37% to 3.6 foot-candles. Replacing old lamps with new lamps of the correct voltage-rating produced another increase of about equal amount, while finally a re-painting of the interior resulted



Growth of Farm Lighting Business.

in a final intensity of over 7 foot-candles, all without increasing the power consumption in the slightest. Cases No. 2 and No. 3 of this same experiment showed similar gains that resulted from intelligent maintenance, all adding weight of testimony to the fact that *it pays to clean.*

12. Probably the greatest safety slogan is the old railway crossing sign, "Stop, Look and Listen!" But if the old time employe must stop, wipe his spectacles and step to a window in order to look, something is wrong with the illumination. If it is necessary to stop before looking, one has lost something, either efficiency of production or accuracy or the chance to save one's self from accident and injury. If the factory is well lighted, the employes may look *without* stopping.

All these and many more arguments are being discovered as studies are made of efficiency and of safety as influenced by illumination. Many of us will recall the character, Scrooge, in Dicken's Christmas Carol who "liked darkness because it was so cheap," but in these modern times that idea has been utterly replaced by the larger truth that darkness in our industrial operations is very, very expensive.

SUCCESS ATTENDS TRIALS OF NEW ELECTRIC BATTLESHIP.

The superdreadnaught *Maryland,* third in order of completion of the electrically propelled battleships of the U. S. Navy, was given its official dock trials or first run under load at Newport News on May 2, 3 and 4 and proved most satisfactory in every particular; in fact, the demonstration was the best for capital ships that U. S. Naval and shipbuilding engineers have witnessed in 25 yrs. There was not a hitch, not even a bearing running hot, either in the main propulsion apparatus or the engine-room auxiliaries. The *Maryland* is expected to go to sea late in June for the shipbuilders' sea trials and will be ready for acceptance by the Navy early in July.

In making the trials the ship was secured to the dock by heavy cables and then the complete propelling machinery was set in operation; not all at once since this would be too great a strain for the dock anchors, but in different combinations. The propelling machinery consists of two turbogenerators, each designed to develop 11,000 kw. at a speed of 2030 r.p.m. to drive the ship at the rate of 21 knots; four induction motors, each rated at 7025 hp. at 170 r.p.m., which are directly connected with the four propeller shafts. The turbogenerators also supply current for the operation of the electrically driven engine-room auxiliaries. During the trials lasting 16 hrs., with 8-hr. tests on each of the turbogenerator sets, the motors were operated separately and paired in various combinations, being subjected to strains equivalent to making 21.5 knots at sea. The strain on the turbogenerators was equivalent to making 16 knots at sea, which represented the maximum amount of power that could be undertaken with safety.

The *Maryland* was built by the Newport News Shipbuilding and Dry Dock Co., and the electrical equipment was manufactured by the General Electric Co. This was the first experience the shipbuilding company has had in installing the electric drive in a battleship, and the success of the test reflects particular credit to the company as well as for the type of apparatus used. In declaring the test the smoothest seen in 25 yrs. the naval engineers took into consideration the first trials of the reciprocating-engine drive, the direct-connected-turbine drive, the geared-turbine drive and the present electric drive, which is similar to that installed in the *New Mexico.* Two more battleships are being equipped at this yard with similar machinery—the *West Virginia,* which will be ready for its trial tests late in 1922, and the *Iowa,* which will be ready for tests in 1923.

Senator Willis of Ohio has introduced a bill in Congress authorizing the Interstate Commerce Commission to approve the consolidation of telephone systems when the public interest demands. The measure is designed to improve the situation in communities having dual and competing telephone service.

Colored Lighting Equipment and Its Applications

Recent Developments Have Established Practical Success in Use of Colors for Store and Auditorium Illumination—Devices now Available for Use in Small as Well as Large Installations

By FRANK B. RAE, Jr.

In the past there has been much speculation on the revolution sure to come in artificial lighting with the introduction of adequate facilities for obtaining colored effects. It was predicted that the marvelous hues which have entertained us in the theatre would soon be available for commercial use generally and for beautifying the home.

Now, with the appearance on the market of simple practical equipment for throwing a blaze of color over the show window it is apparent that the looked-for opportunity is here so far as commercial purposes are concerned. The apparatus, consisting of reflectors and screens of colored gelatine or glass which fit into place with a simple fastening, as evolved by three different manufacturers, is practical for the small haberdashery, the women's wear shop, and the hardware or furniture store, as well as for the large department store. It represents a development of first importance to the entire industry, from central station to contractor-dealer.

It has been abundantly shown that colored light increases many times the drawing power of a display window. A flood of rose or orange or green illumination cast upon an exhibit of merchandise makes that display stand out as nothing else can do. A window bathed in red light takes the eye and holds the attention far more effectively than a window of red goods could possibly do.

Success Attended Early Attempts at Use of Colored Light.

Metropolitan merchants who experimented with the gelatine films and uncertain dyes for dipping lamps, which have hitherto been the only means of obtaining these effects, have been envied by the smaller dealer. One of the most beautiful of these windows recently exhibited contained a bathing-suit display by Hartzfeld's, of Kansas City, Mo. The window was planned to represent a private natatorium. The tank was filled with water which had been dyed to give it the effect of depth. In the background an oil painting on canvas showed a submarine view in ultra marine blue. Boxes of ferns stood at each side of the tank, and at the back a girl's figure was poised wearing a bathing suit. The scene was ablaze with blue light, except for two white spotlights which were thrown upon the figure. The display stood out as a very striking picture.

A remarkable example of the power of colored light may be seen in large "movie" houses in New York and other cities at present. Before the show, and during intermissions, the manager entertains his audience with a "chorus" of beautiful colored light accompanying the music. The orchestra leader beats time with one hand and with the other ever and again presses a buzzer as a signal to the electrician. At his touch the

Lighting Unit With Opaque Reflector and Gelatine Color Screen.

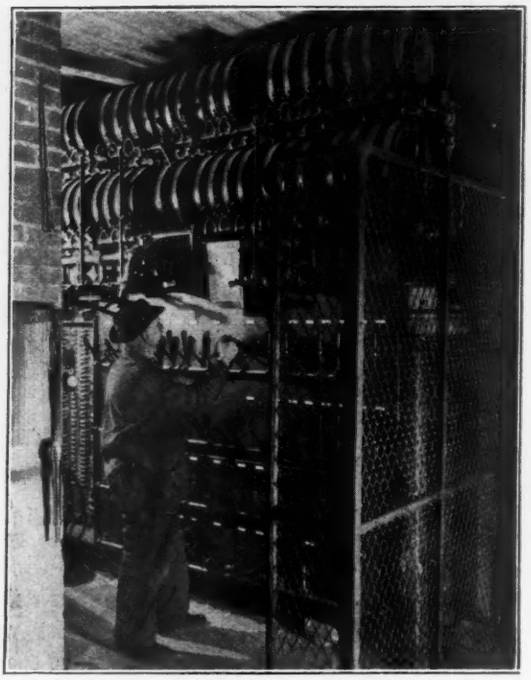
colors of the rainbow glow across the auditorium. Soft shades of rose or blue appear gradually and grow in intensity or fade and change as the music becomes passionate or subdued. The sight of an audience of 4000 or 5000 people swayed by the shifting colored light is a revelation of its possibilities. Behind the scenes in these movie palaces is a switchboard as large as the side-wall of an average room, presenting an array of dimmers, switches, plugs and buttons which is impressive—and which means big business for some electrical contractor.

Opportunity Now Open for Use of Colored Lights in Small Establishments.

These large-scale installations have blazed the way for the ordinary retailer, and now, with simplified equipment available he can take advantage of the experience of the movie man and the metropolitan merchant. It is necessary, of course, to experiment with displays until one learns just what effect to expect with goods placed under colored illumination. Since the color of any object depends wholly upon the rays of light which travel from its surface to the eye it is apparent that a red book under red light will ap-

pear to have a very vivid color, because of the great number of red rays which its surface will reflect. Orange, yellow, and brown hues will also gain in richness under red illumination. But if green light is introduced, containing comparatively few red rays, the red book will seem to be brown; orange will seem faintly yellow, with a touch of green, and violet will appear brown touched with bluish-gren. Under light containing absolutely no red rays the red book would look black, for its surface would have the power of absorbing all the hues of the spectrum excepting only red, and red being absent in this case there would be no color reflected at all.

These color reactions may be used to good advantage to improve the color appearance of goods on display. To emphasize the whiteness of merchandise, or to bring out blues, the merchant will employ pale blue-green light containing very few red or yellow rays. Slight rose or amber tints are valuable if lay figures are used in the window,

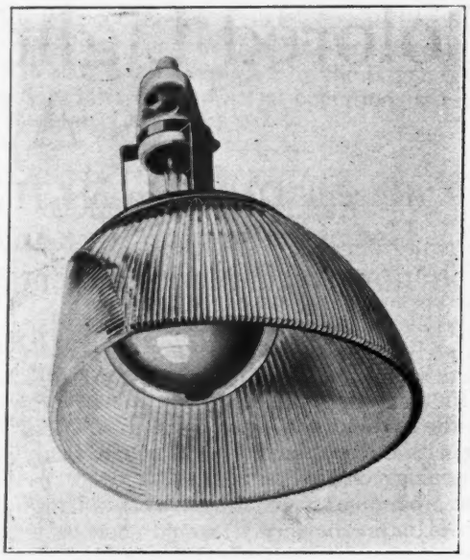


Switchboard for Control of Colored Light in "Movie" Auditorium.

or if, perchance, a living demonstration is being carried on, for the human features acquire added charm under these lights. A simple rule is that light of the same color as the object, or of similar hue, increases the vividness of that color, and light of totally different color composition will entirely altar the color of the object.

Variety of Results Possible by Properly Choosing Equipment.

By leaving one or two lamps bare it is possible to dilute the intensity of colored light in the window. Red light, for example, will become pink if one or two lamps are left unmodified. Or two or more colors may be mingled in the display by placing screens of different hues on the lamps, and there is practically no limit to the variety of beautiful effects which may be obtained.



Prismatic Glass Unit With Colored Globe Over Lamp.

Spots of color, as contained in the ordinary show window, attract the eye for the moment, but "color-flooding" the entire scene holds the attention tenaciously, as has been proved by the tests of psychologists. M. Luckiesh of the National Lamp Works of General Electric Co., whose research in the lighting field has made him an authority, in his book "The Language of Color," makes the statement that the general color scheme is the factor which is particularly influential and lasting in the memory of those who behold its effects.

The use of this new medium will not only create widespread interest in colored show-window lighting, but it should also bring renewed attention to the general subject of store lighting. It suggests, as Mr. Luckiesh has pointed out in making his investigations, that the use of colored lights is the next important step in the growth of the lighting industry.

Prismatic Glass Unit With Colored-Glass Screen.

Illuminating Laboratory Research and Developments

Lighting Studied and Expanded as a Science and an Art by Long Period of Detailed Investigation—Many Designs and Applications Perfected—Several Examples of Specific Problems Solved

By W. D'A. RYAN

Director, Illuminating Engineering Laboratory, General Electric Co., Schenectady, N. Y.

Twenty-five years ago it was apparent to the writer that thousands of dollars were being spent annually on lighting with very little attention devoted to the economic, scientific or proper application of the lighting sources. This suggested the idea of developing a new science to be known as "Illuminating Engineering" to be followed later by the development of the "Art of Illumination." This idea was presented and approved, and the nucleus of the present laboratory was established at the Thomson-Houston works at Lynn, Mass. Light measuring and analyzing devices such as photometers, luximeters and luminometers were built and developed for laboratory and field work, and lumichromoscopes and parachromoscopes were designed for studying the effects of different lights on colored materials. Indirect and semi-indirect lighting units were developed in combination with concentric and adjustable diffusers. Efficient glassware and reflectors of various types soon made their appearance and extensive laboratory and field tests were conducted, scientific data were compiled and development became general in the efficient application of both arc and incandescent lamps.

W. D'A. Ryan.

Illustrated addresses were delivered at several universities and before various bodies in different parts of the country. As a result much contemporaneous work was started, other laboratories were established, and the Illuminating Engineering Society was finally formed, which gave further impetus to the work. The scope of illuminating engineering has developed into an exceedingly broad field, embracing the study and application of physics, psychology, physiology, architecture, interior and exterior decorations, ophthalmology, sanitation, medicine, therapeutics, etc.

In 1909 the illuminating engineering department was moved from Lynn to Schenectady, and in 1918 the laboratory was considerably extended in order to collaborate properly with the Army and Navy on the testing of searchlights and other devices for war purposes. The laboratory undertakes thorough investigations of all means and methods of artificial illumination and testing of lighting units for ordinary commercial and special applications. The work is divided into commercial investigations and applications, photometric testing and development, research, and photographic, artistic and mechanical design. The commercial division is constantly giving advice and furnishing lighting recommendations to all parts of the world and for all classes of lighting under the following subdivisions which were established in 1904: Mill lighting, armory lighting, subway lighting, factory lighting, waterfront lighting, office lighting, store lighting, ship lighting, drafting-room lighting, railway-yard lighting, machine-shop lighting, decorative lighting, street lighting, foundry lighting, sign lighting, park lighting, mine lighting, window lighting, theater lighting, house lighting, train lighting, church lighting, shed lighting and other miscellaneous types of essential and special lighting in modern use.

Noteworthy Example of Domestic and Foreign Installations.

Some diversified domestic examples of note are the lighting of the Singer tower in New York, Buffalo General Electric Co.'s building, Panama canal locks, illumination of Niagara Falls in 1907, lighting of the Hudson-Fulton celebration in 1909, lighting of the Panama-Pacific International Exposition in 1915. Some of the noteworthy street-lighting propositions of recent installation are the intensive lighting of San Francisco, Los Angeles, Salt Lake City and Saratoga Springs. The laboratory has always had more or less foreign work, but since the International General Electric Co. has been formed this has been increasing rapidly. The following tabulation gives a few typical foreign installations which have been engineered in the laboratory:

Canada.—Store lighting, B. Harris, Hamilton, Ont.; street lighting, Campbellford and Welland canal, Ontario; flood lighting, Toronto.

West Indies.—Stores, Calzado Y Curtidos Co.

Studio Where Decorative Treatment of Lighting Standards, Devices, Globes, Etc., is Developed.

Research Room With Spectrophotometer Used in Analyzing Light From Color-Matching Units, Colored Glass, Etc.

and S. A. Benjamin, Havana, Cuba; street lighting, Havana Electric Railway, Havana, Cuba; industrial, Cuban Cane Sugar Corp., Havana, Cuba; street and house lighting, Reparto Miramar, Havana, Cuba; street lighting, Kingston, Jamaica, and Santiago, Cuba.

Central and South America.—American Trade Developing Co., Panama; street lighting, Lima, Peru; Estanifera de l'Lallgua, Santiago, Chile.

Europe.—Street lighting, Harbin, Russia, and Estoril Estate, Lisbon, Portugal; dock lighting, France.

New Zealand and Australia.—Industrial, New Zealand Farmers' Fertilizer Co., Te Papapa, New Zealand; street lighting, Ashburton, New Zealand; Domain swimming baths, Sidney, Australia.

China and Java.—Power station, Kwangtung Electric Supply Co., Canton, China; Central Municipal offices, Shanghai, China; textile mills, China; street lighting, Semarand, Java; harbor and street lighting, Makassar, Java.

India.—Imperial government house, Delhi; illuminated fountain, Mysore government; Andhra Valley Power Supply Co., Bombay; street lighting, Kennedy Sea-Face, Bombay; street lighting, Bombay.

Laboratory Room Where Special Tests and Demonstrations Are Made.

Japan.—Everett Frazar Memorial Hall, Tokyo.

Illumination Data and Tests Supplied by Laboratory Experts.

In addition to issuing lighting recommendations to prospective customers through the regular channels the laboratory furnishes illumination data to all divisions, outside departments, sales offices and through them to the general public. Tests are made on all kinds of lamps and lighting equipment.

Many street lighting and interior systems are tested under operating conditions, and experimental tests are frequently carried on night and day when information is required on short notice. New lighting apparatus and systems are constantly being devised, constructed and tried out to determine their commercial value or application to some special purpose. In addition to a certain amount of new development work the laboratory has occasion to collaborate in this respect with other engineering departments. This applies largely to arc and incandescent searchlights, arc lamps, incandescent lamps and lighting units, ornamental poles, lighting fixtures, etc. The research division carries on investigations of a scientific nature.

The art department is maintained where special designs of lighting systems are prepared graphically, and where the designs are created which ultimately reach the various lighting-pole manufacturers. Complete plans for interior and exterior displays, pageants, electrical shows, etc., have been prepared and executed under the supervision of the laboratory.

Large numbers of photographs of day and night views of illumination effects—interior and exterior—are furnished the sales offices, architects, consulting engineers and others. The scope of the educational work embraces a systematized training course for student salesmen and engineers; illustrative lectures on lighting subjects, and the preparation and distribution of technical and popular articles for publication. Hundreds of domestic and foreign visitors are annually entertained and instructed by inspection trips through the laboratory.

SUGGESTIONS SOUGHT FOR BETTER FIXTURE MARKET.

National Council Seeks Comments on the Buffalo Exposition With a View to Improvement of Future Lighting Displays.

Charles H. Hofrichter, secretary of the National Council of Lighting Fixture Manufacturers, is canvassing the trade for comments and suggestions which will serve as a guide for the betterment of future lighting fixture markets. He has issued the following circular:

"We believe you will agree that the Buffalo Fixture Market was an even bigger success than the one in Detroit the year before. But we want to make each successive Market better than the last. We are therefore asking you to send us your suggestions as to what, in your opinion, would help us to give you better service and to make our Fixture Market more profitable to you and more attractive to your customers, the dealers. We will appreciate your honest comments on the Buffalo Market if you have not already sent them in."

This campaign in quest of helpful information was started even before the Buffalo Market closed. Circulars were sent to the various exhibitors at their booths and they were invited to write their criticisms on the reverse side of the circular.

The Eastern Shore Electric Co., Milton, Del., has been granted permission by the Common Council to increase its local lighting rates from $0.12 to $0.15 per kw-hr. for the next 6 mo.

EDITORIAL COMMENT

Proper Illumination Intensities

Illuminating engineers have given considerable attention to the proper illumination of buildings and rooms from artificial sources, taking into consideration the particular uses to which individual rooms are to be put. It is generally recognized that illumination requirements differ according to the work which is to be done. Thus, where it is necessary to discern detail a higher intensity will be required; visual acuity, as a rule, increases with the intensity of illumination. In large rooms or auditoriums where vision extends over a considerable distance it is also necessary to have higher illumination on the stage, platform or other remote object than where vision is entirely at close range.

Values have been tabulated, giving intensities of illumination recommended for rooms devoted to various specified uses. It should be remembered, in this connection, that the light reflected to the eye by any surface depends upon the reflecting power of that surface, and consequently the same illumination intensity upon surfaces of different quality will produce different effects so far as seeing is concerned. The proper intensity of illumination depends largely upon the general color scheme of a room and the physical properties of its exposed surfaces. To a certain extent this can be taken care of in such tables as those above referred to, since the general fittings in a clothing store will be of one kind, in a candy factory another, and in a type-setting room still another. It cannot be assumed, nevertheless, that a typical value will be suitable for any individual installation coming in a given class, since there will always be individual variations in the surface conditions.

Ability to see depends not only upon surface brightness, but upon contrast between the different surfaces which the eye is called upon to perceive. Such contracts in any given room are consequently of equal importance with the individual characteristics of the separate surfaces. White objects against a black background can be seen readily under a very low illumination, whereas brown or grayish objects under the same conditions would require a high intensity. The above is sufficient to indicate that in planning the illumination for any particular case tabulated values recommended by authorities, however good, should not be implicitly followed, but should be regarded as average values which may require modification according to local circumstances. Unless these limitations are kept in mind the reference to such tables may prove a detriment rather than a help in planning a particular installation.

Lighting Improvements in Small Towns

In large cities the advent of improved electrical equipment tends to stimulate more business for the trade, but the magnitude of the installation is often the deciding factor in the amount of attention attracted from the public. It is worth realizing however, how much even minor improvements mean on the smaller scale of the little town where the introduction of one or more novel devices may be "the talk of the main street" for a week. If it can be so expressed, the proportional influence of a comparatively small installation strictly up-to-date may be greater in the small town than in the city. This is a real help to the manager of a small business property, since it can often be fitted out with the latest equipment on a small scale at a cost far below that required in a larger community, and the commercial "pulling power" of even a small but advanced device is in many cases remarkable.

Central-station managers easily fall into the habit of regarding these improvements largely from the engineering standpoint, which is necessary and desirable, but in handling small properties the individual-interest factor of an installation is very important. Thus, a retailer in a small winter-resort town equipped his store with indirect lighting. The installation was the only one of its kind in the place, and although it consisted of only three inverted reflectors, each used in connection with a 100-watt lamp and a well whitened ceiling, the "tone" imparted to the establishment made the store a marked place in the eyes of the inhabitants. Here the expenditure of a modest sum put the store on an entirely different plane from all the others in the place, arousing a good deal of interest among the villages and instantly attracting the patronage of the city visitor accustomed as he was to trade at home in establishments paying scientific attention to modern illumination.

Of course, the pre-eminence of such a store lasts only a short time by the introduction of a comparatively inexpensive layout of equipment; but one thing leads to another in small-town central-station operations, and local feeling can be appealed to very effectively by inducing one mer-

chant to install the latest equipment known to the industry. Others want the same thing soon, and the central station and contractor-dealers get the benefit of such progress at a very small cost.

Cause for General Regret

W. W. Freeman, president of The Society for Electrical Development, announces that at a meeting of the Board of Directors of the Society held in New York City, May 10, James M. Wakeman tendered his resignation as general manager of the Society, which was accepted effective as of Sept. 1 and leave of absence granted from June 1. Mr. Wakeman has served as general manager of the Society from the commencement of its activities and has rendered most valuable services to the Society and the industry in that capacity.

The directors of the Society are unanimous in their expression of regret—and the ELECTRICAL REVIEW echoes this regret—that Mr. Wakeman finds it necessary to withdraw from the executive direction of the Society's activities, and heartiest wishes will follow him into his future field of efforts. A committee was appointed to draw up a suitable resolution to express the appreciation of the directors. The committee's resolution, which was passed unanimously, reads as follows:

"The Board of Directors of The Society for Electrical Development, in accepting the resignation of James M. Wakeman, its general manager from the date of its organization, desires to enter on the minutes its full recognition and appreciation of the very valuable, comprehensive and enthusiastic work given by him to the Society. Mr. Wakeman has been constant and industrious in his efforts and has won for himself not only the sincere commendation of the Board as a whole for the conscientious and able performance of his duties, but is entitled to and receives the personal respect, esteem and good wishes of every member. The standing and influence of the Society today is to be largely attributed to the splendid and faithful efforts of Mr. Wakeman, and the directors of the Society take pleasure in so stating as part of the minutes of this meeting."

Effective June 1, William L. Goodwin, assistant to the president, will assume charge of both the office and field activities of the Society. Its affairs are thus left in very capable hands, and Mr. Goodwin can undoubtedly count upon the fullest measure of co-operation from all elements of the industry, including ELECTRICAL REVIEW and other trade and technical journals in the field.

Miners' Strike in England

While contending with our own problems of industrial unrest and labor troubles, we are apt to overlook the fact that our difficulties are light compared with those which have faced European countries during the period of reconstruction following the war. An editorial in a recent issue of the London *Electrical Review* deals with the miners' strike, and is of particular interest because this publication, which is noted for its broad outlook and far-seeing policy, condemns the miners and considers their attitude entirely unjustifiable. The miners were evidently determined that, come what might, they would make a fight to maintain their privileged position at the expense of their fellow-citizens. The actual cost to the country of working the coal mines and paying the miners greatly increased wages for less output per man has been of the order of $5,000,000 every week. The British public does not understand why one section of the community should be subsidised by the rest to the tune of approximately $270,000,000 per annum, and if justice and reason are to prevail it would seem that the miners are bound to be the losers in the long run. They have aroused the anger and fighting spirit of the British public, not only by their unpatriotic action but also by their attempts to ruin the mines unless their demands were immediately agreed to. In other words, they demanded surrender as a preliminary to negotiation. Many pits have been permanently ruined, while in other instances weeks and even months must elapse before the damaged machinery can be replaced. This is the first occasion on which so desperate and senseless a course has been adopted by the miners; and, if such methods are to become the rule when labor makes a demand for improved conditions or higher wages, the end is likely to be disappointing to the workers. Ill counsel prevailed to such an extent that the miners would not even permit volunteer workers to save from destruction the property from which they (the miners) derive their livelihood. The outlook of the workman is notoriously narrow, and he is not always well-advised in embarking on certain lines of action which are supposed to lead to his immediate advantage. We know that he is not always generously or even justly treated by his employer, and that combinations of working men such as trade unions are necessary to him; but at a time when signs of the long awaited revival of trade in Europe are accumulating and hopes of a return to pre-war prosperity are gaining strength, any action which tends to maintain the high cost of living and delay the revival of foreign trade is not likely to be to the ultimate advantage of the workman.

Although socialistic ideas with a leaning toward Bolshevism find more fertile ground in Europe than in this country, the British people believe so firmly in government by popular suffrage that they will not tolerate the ascendancy of any

revolutionary body, and the methods and aims of the miners in connection with this strike meet with so little support from the public at large that the men are not likely to gain their ends at the present time.

The British miners, through ignorance or the short-sighted policy of their leaders, have made demands which cannot be justified economically. This is a fatal mistake. It is natural that indignation has been aroused and that much bitter feeling exists between the strikers and those that they are striving to injure by their unjustifiable action. On the other hand, if we view the situation impartially and study both sides of the question, it would appear that ignorance of the essentials of economic science is not the attribute of labor alone, but that the employer is also in need of instruction and the cultivation of the spirit of tolerance which would enable him to meet his opponent half way and come to some understanding which would terminate the unfortunate industrial unrest.

Many suggestions have been made, both in our own country and abroad, to bridge the chasm between Capital and Labor and bring about a better state of things in the industrial world.

Many of these proposals are revolutionary in principle and perhaps for that reason are not likely to make much headway; but thinking men are prepared for big changes if these will ensure more stable industrial conditions. The reason why the British miners have alienated the sympathies of nearly everyone outside of their own class may perhaps be attributed to the fact that their recent policy clearly indicates the intention on their part to benefit from the labor of others and not from wealth created by their own effort and industry. We do not think, however, that good can come of a prolonged fight, especially where both sides appear to be partly in the wrong. There is probably more hope of a final solution through education, and individual effort, aided if necessary by active propaganda, all with the aim of establishing better and saner relations between employer and employed, both of which at the present time appear to be sadly lacking not only in the fundamentals of economic science, but also in the charitable feelings which should exist between man and man.

Hydroelectric Power in New York State

Fuel conservationists in every state will be encouraged by the fact that the way has been cleared for the harnessing of the water power of the State of New York for hydroelectric use through the signing of the Gibbs-Adler water power bill by Governor Nathan L. Miller which ended a bitter fight lasting for a period of 10 yrs. One faction had stood for state development of the power and the other for development by private corporations and the latter has won, and we think wisely. The aggregate water power of the State of New York will undoubtedly exceed a million horse-power. Under the bill the state is authorized to lease this power to private corporations for terms of 50 yrs., or less if deemed advisable.

A water power commission has been appointed of which the conservation commissioner, attorney general, state engineer, a senator and the speaker of the house are the members. They have received an appropriation of $25,000 to ascertain the amount of water power latent in the state and have authority to lease this power to private corporations, individuals or municipalities. Cities which have the proper facilities for this development will be given preference.

Complete control of the companies developing water power is given to the newly-created Public Service Commission which has authority to fix rates. A nominal fee is to be charged for the use of the power on the theory that the water belongs to the people of the state and their interests can best be served by providing electric power at a low rate in this way.

This is the first time, it is believed, that the right of eminent domain has been conferred on private corporations in condemnation of private property. It is believed that the water power in the Niagara river and power now going to waste at the locks of the barge canal and the many thousands of horse power lying idle in unnavigable streams throughout the state will be turned into use for producing electric power and electric illumination.

Electric Fan Service

Although the electric fan has many uses during the winter season, there are a large number of owners of these devices who stow them away in the fall and do not bring them out again until the advent of hot weather in the following spring. As in the case of every other apparatus with moving parts, a fan should have an occasional overhauling to see that its bearings are in good running condition and that no defects have developed. A good time to do this overhauling of fans is before hot weather actually arrives. The electrical contractor who utilizes this occasion can develop quite a little business in overhauling electric fans. Cleaning is usually necessary even when no other attention is imperative. Indeed, it is perhaps a desirable procedure when a fan is sold in the first place to make some arrangement for subsequent care. It is probably easier to do this at that time than at any other.

THE WEEK'S NEWS

Reports of Important Meetings, Developments and Other Happenings of the Electrical Industry and Its Allied Interests

N. E. L. A. MEMBERS PREPARING FOR CHICAGO MEETING.

Convention Committee Is Prepared for the Largest Gathering of Central-Station Interests in History of Electrical Industry.

Executive committees of the various sections of the National Electric Light Association are scheduled to arrive in Chicago and assemble in their several committee meetings on the evening of May 30, the day before the official opening of the convention. The last day of the convention will be given over largely to the visiting of large industrial works and points in and about Chicago. There will be a reception by President Martin J. Insull on the evening of May 31.

Because of lack of suitable space at the Hotel Drake, as well as the unusual expense attached to the undertaking, the Committee on Exhibition has decided to dispense with the customary exhibition this year. However, there will be a unique and interesting exhibition and demonstration of advanced ideas in residence lighting which will be conducted under the auspices of the Lighting Sales Bureau of the Commercial National Section. This exhibition will be at the Hotel Drake and will be open and in operation continuously during the convention.

The Hotel Drake, where the convention will be held, is on the North Shore of Lake Michigan approximately 1.5 mi. from the Loop, or heart of the city. It is easily reached by streetcars, motor busses and taxicabs. Because of the large attendance expected, it may be impossible for the Drake to care for all of them. There are, however, other modern hotels within a few blocks where the overflow may find good accommodations convenient to the convention headquarters. Hotel reservations should be made promptly to Fred R. Jenkins, Commonwealth Edison Co., 72 West Adams street, Chicago, chairman of the Convention Hotel Committee. G. H. Atkin, Room 713, 140 South Dearborn street, is master of transportation and will furnish information regarding special trains and rates of fare to the convention.

For any special information required in connection with the convention, those expecting to attend may inquire of the chairman of the General Convention Committee, E. W. Lloyd, Commonwealth Edison Co., 72 West Adams street, Chicago, or the headquarters of the National Electric Light Association, 29 West 39th street, New York City.

WILL INSTALL LIGHTING EXHIBIT IN BOSTON.

The Bureau for Better Illumination is arranging to have installed in room 10, Rogers building, Massachusetts Institute of Technology 491 Boylston street, Boston, an industrial lighting exhibit to demonstrate what good lighting is and what it can accomplish. In sending out this announcement, James E. Wilson, secretary of the Bureau, states:

"Do cloudy days slow up your employes? Is there a difference in the late afternoon or on the night shift as regards production? You have probably heard about high intensity industrial lighting, but do you realize that it actually will (1) increase production, (2) decrease spoilage, (3) decrease accidents, (4) improve morale and sanitation, and (5) cost less than poor light. These are facts; facts based upon many practical tests; facts that you cannot well overlook. In order that you may see these things for yourself we plan to install an industrial lighting exhibit, which will be a first-class demonstration that any business man can understand of what good lighting is and what it can accomplish."

REVIEW OF BUILDING OPERATIONS IN APRIL.

Contracts Awarded in 25 Northeastern States Totaled $220,886,000—April Total 34.5% Greater Than That of March.

According to figures published by the F. W. Dodge Co., construction activity in April was greater than for any other month since June of last year. Contracts awarded in the 25 northeastern states during April amounted to $220,886,000, which is the largest figure recorded for April of any previous year except 1920. April, 1920, was the peak of last year's boom. The April total was 34.5% greater than that for March. During the past 5 yrs. the average increase of April over March has been 14%.

The following further data are taken from the Dodge report:

Residential building maintained the lead over all other classes in April. This class amounted to $75,015,000, or 34% of the total. Public works and utilities took second place, amounting to $48,043,000, or 22% of the total. Business buildings accounted for 13%, or $29,176,000; and educational buildings, 10%, or $22,640,000. The building revival has acquired considerable momentum in the past 4 mo. At the end of January, activity from the first of the year to date was 6% behind the average for the preceding 5 yrs.; at the end of February it was 11% behind; at the end of March, 4% behind; and at the end of April it was 5% ahead of the average for the first 4 mo. of each of the preceding 5 yrs. The total investment represented by building contracts let from Jan. 1, 1921, to May 1, 1921, has amounted to $597,470,000.

The demand for new construction still continues very strong. Contemplated new work was reported in April to the amount of $392,272,000, bringing the total of contemplated work reported from the first of the year up to $1,694,384,000,

nearly three times the amount of contracts awarded in the same period. The demand for new construction is so insistent that it seems likely that increased activity will prevail during the coming months. At the present time the one thing that threatens a setback is the attitude of labor. Wage disputes are reported from numerous large centers. However, in view of the fact that other fields are so much less active than construction and that the amount of unemployment is a matter of serious concern, it seems probable that, at the worst, labor troubles will retard construction activity only temporarily.

New England.—Contracts awarded in the New England states in April amounted to $17,828,000, an increase of 35% over the March figure. Total construction started in the first 4 mo. of this year has amounted to $46,402,000. While this is less than the average construction figure for the first four months of the five years previous to 1921, it is 25% greater than the figure for the same period in 1919, that year in which the economic factors affecting construction were most nearly like those of the present year. Included in the April, 1921, contracts were: $6,941,000, or 39%, for residential buildings; $3,859,000, or 22%, for business buildings; $1,773,000, or 10%, for industrial buildings; $1,708,000, or 10%, for public works and utilities. Contemplated new work was reported during April in this section amounting to $42,091,000.

New York State and Northern New Jersey.—In New York State and Northern New Jersey, April building contracts amounted to $51,027,000, an increase of 70% over March. Of this total 55% was for residential buildings. Total construction contracts in this district for the first 4 mo. of this year have amounted to $123,649,000, which is 13% greater than the average for the first 4 mo. of the 5 yrs. preceding 1921. Included in the April, 1921, figures were: $28,146,000, or 55%, for residential buildings; $6,861,000, or 13%, for business buildings; $4,902,000, or 10%, for public works and utilities; and $4,720,000, or 9%, for social and recreational projects. Contemplated new work was reported during April to the amount of $91,991,000.

Middle Atlantic States.—Contracts let during April in Eastern Pennsylvania, Southern New Jersey, Delaware, Maryland, District of Columbia, and Virginia amounted to $27,246,000, a slight increase over the March figure. The total construction contracts in this district for the first 4 mo. of the year have amounted to $84,599,000. This figure is less than the average for the same period in the last 5 yrs., but it is 12% greater than the total for the first 4 mo. of 1919, when economic conditions were most nearly like those of the present year. Included in the April total were the following items: $9,995,000, or 36%, for residential buildings; $7,461,000, or 27%, for public works and utilities; $2,244,000, or 8%, for business buildings; $2,069,000, or 8%, for industrial buildings. Contemplated new work to the amount of $55,957,000, was reported for this district in April.

Pittsburgh District.—Contracts awarded during April in Western Pennsylvania, West Virginia, Ohio, Kentucky, and Tennessee, amounted to $42,020,000, an increase of 8% over the March figure. During the first 4 mo. of this year, construction contracts in this district have amounted to $127,892,000. The average for the same period in the preceding 5 yrs. was $98,068,000. April, 1921, contracts included the following: $12,130,000, or 29%, for public works and utilities; $11,036,000, or 26%, for residential buildings; $5,562,000, or 13%, for educational buildings; $5,133,000, or 12%, for social and recreational projects. Contemplated new work was reported in this district during April to the amount of $55,095,000.

The Central West.—April building contracts in the Central West (including Illinois, Iowa, Indiana, Wisconsin, Michigan, Missouri and portions of Eastern Kansas and Nebraska) amounted to $75,006,000, an increase of 55% over the March figure. The April construction figure brought the total for the first 4 mo. of the year up to $192,018,000, compared with $176,444,000, the average for the first 4 mo. of each of the preceding 5 yrs. April, 1921, contracts included the following: $19,474,000, or 26%, for public works and utilities; $17,266,000, or 23%, for residential buildings; $11,471,000, or 15%, for business buildings; $10,821,000, or 14%, for educational buildings. Contemplated new work to the amount of $128,437,000 was reported in this district during the month of April.

The Northwest.—April building contracts in Minnesota and North and South Dakota amounted to $7,670,000, a slight increase over March. Construction contracts let in this district during the first 4 mo. of the year have amounted to $22,895,000. The average figure for the first 4 mo. of the preceding 5 yrs. was $17,943,000. Consequently, this year has shown an advance of 28% over the average for the preceding five years. Included in the April, 1921, total were: $2,368,000, or 31%, for public works and utilities; $1,751,000, or 23%, for educational buildings; and $1,682,000, or 22%, for residential buildings. During April contemplated new work was reported in this district to the amount of $18,700,000.

KANSAS CITY TO USE AUTOMATIC SUBSTATION CONTROL.

Kansas City Light & Power Co. Plans to Install Five Automatic Stations With an Approximate Capacity of 15 000 Kw.

The largest system of automatic stations in the world will soon be put in operation in Kansas City, Mo., by the Kansas City Light & Power Co. The entire Edison system of the city is to be controlled from a series of five automatic stations, each containing two synchronous converters, operating independently. The automatic switching equipment and the machines are to be furnished by the General Electric Co.

These five substations will be all fed from a central steam-generating plant, through a network of radial feeders. The capacity of the generating station at present is 60,000 kw., but the ultimate capacity is expected to be more than 150,000 kw. The Edison system will have an approximate capacity of 15,000 kw.

The supply will enter each station at 13,200 volts, 60 cycles, 3-phase, and will be converted to direct current by two machines in each station.

Eight of these are rated 250 volts, 6000 amperes, the other two being rated 250 volts, 9000 amperes. Each machine will be equipped with an automatic switching equipment so that, in case the line normally feeding it fails for any cause, power is immediately fed to it from another line. As soon as normal conditions are restored on the regular feeder, the machine is automatically switched back by this equipment.

The fact that a city of the size and importance of Kansas City has decided to use automatic station control would seem to indicate that this type of station has made a permanent place for itself by its superior operating and economic features. Its development from the first remotely controlled stations which were installed in Detroit 10 years ago to an installation of this size has been as rapid as any in the history of the electrical industry.

GOODWIN TO DIRECT S. E. D. FIELD ACTIVITIES.

At its annual meeting held May 10 in New York City the Society for Electrical Development re-elected the former members of the Board of Directors. The Board then re-elected W. W. Freeman, president, and J. E. Montague, Fred Bissell, J. Robert Crouse, A. W. Burchard and J. R. Strong, vice-presidents. The former Executive Committee, with Charles L. Edgar as Chairman, was re-elected.

The Board accepted the resignation of J. M. Wakeman, general manager of the Society, effective Sept. 1, and gave him a leave of absence from June 1. Resolutions of regret and appreciation of the work done by Mr. Wakeman for the Society were unanimously adopted. Beginning June 1, William L. Goodwin, assistant to the president, was elected to assume charge of both the office and field activities of the Society.

UTILITY'S ANNUAL REPORT MAKES GOOD SHOWING.

The 1920 annual report of the Standard Gas & Electric Co. shows that the utility subsidiaries as well as the parent company enjoyed their most successful year. The following is quoted from President Byllesby's letter to stockholders:

"The increase in gross earnings, amounting to $5,194,094 for the year, is the largest annual increase so far attained by your company's subsidiaries—and while a portion of such increase is due to increased rates, the growth in volume of business was by far the more important factor. This is indicated by the increase in electrical energy sold. Electrical output sold in 1920 increased 12.86% over 1919. Operating expenses continue at an abnormal rate, but fuel, heretofore one of the principal factors of increased costs, is beginning to show a tendency to decline in many localities, although on the Pacific Coast fuel oil has actually advanced. The Railroad Commission of California has given the increased cost of fuel oil consideration in recently granting the San Diego Consolidated Gas & Electric Co. increased rates. With the return to more normal operating conditions decreased rates are naturally looked forward to. There has been no change in the established policy of your company's subsidiaries to reduce rates whenever possible. At the present time, however, there appears to be little probability of any reductions except possibly in one or two localities where rates were increased during the latter half of 1920 by reason of extraordinary high fuel costs, which quite recently have been followed by a return to more normal prices."

A. S. M. E. TO DISCUSS POWER TEST CODES.

Organization of an Engineering Society Among Subjects to Be Discussed at Spring Meeting of Society.

An important work of the American Society of Mechanical Engineers is the development of the power test codes. The first three codes will be presented for public hearing May 25 at the spring meeting of the Society, which will be held at the Congress Hotel, Chicago, May 23-26. These are the codes on general instructions, reciprocating steam engines and evaporating apparatus. An opportunity will be offered for full public discussion, which will be carefully considered before the final adoption of the codes.

The tentative program for the meeting provides for a business session in the afternoon, at which there will be a discussion of changes in the constitution and by-laws and a paper by M. L. Cooke on "The Organization of an Engineering Society." In the evening there will be a reception and dance at the Congress Hotel. There will be simultaneous meetings on the morning of May 24 of the Fuel, Machine Shop, Management and General Sessions, and in the afternoon an excursion has been arranged for to the plants of the International Harvester Co., Sears, Roebuck & Co., Western Electric Co., etc. In the evening there will be a session on training for the industries.

Wednesday, May 25, there will be simultaneous meetings in the morning of the Chicago and General Sessions, and a public hearing on power test codes. In the afternoon there will be excursions to the plants of the Illinois Steel Co., Commonwealth Edison Co., Pennsylvania Terminal and Crane Co., followed by a dance at the Congress Hotel in the evening.

On the morning of May 26 there will be simultaneous meetings of the Railroad, Materials Handling, Forest Products and Power Sessions. In the afternoon excursions have been arranged for to the plants of the Chicago Mill & Lumber Co., Underwriters' Laboratories, etc.

CONFERENCES ON STANDARDIZATION HELD IN THE EAST.

In compliance with a joint request from the American Institute of Architects and the National Association of Electrical Contractors and Dealers, the American Engineering Standards Committee issued a call for a conference of representatives of all interested national organizations for the purpose of adopting a program looking toward the establishment of national symbols for electrical equipment in buildings. This conference was held May 10 in the Board Room of the American Institute of Electrical Engineers, 29 West 39th street, New York City.

At the request of the American Engineering

Standards Committee the Bureau of Standards and the Society of Automotive Engineers have agreed to act as joint sponsors for a Safety Code for Aeronautics. These sponsors called a conference of representatives of interested national organizations to consider the scope of the proposed code, the method of its development and the make-up of the sectional committee to be organized under their direction. This conference convened May 13 in the rooms of the National Advisory Committee for Aeronautics, 2721 Navy building, Washington, D. C.

CORROSION PROBLEMS DISCUSSED BY A. E. S.

American Electrochemical Society Absorbs Electric Furnace Association, Which Will Be Made Section of Society.

The 39th general meeting of the American Electrochemical Society was featured by a symposium on corrosion of various metals and alloys under different conditions, and the means for combating such corrosion. More than 30 papers were presented, covering a wide range of subjects.

An important development of the convention was the formal decision by the American Electrochemical Society to absorb the Electric Furnace Association, and the Society will in the future have an electric furnace section, which will be the first of several sections into which the Society will be divided. Other sections also are planned and the constitution and by-laws of the organization will be amended to provide for these sections and to more clearly define the objects of the Society with particular reference to the electrothermic field, including heat treating. Formation of an electro-deposition section was proposed, to include electroplating, electrotyping and similar branches. A committee, headed by William Blum, was chosen to investigate this subject.

Acheson Smith, Acheson Graphite Co., Niagara Falls, N. Y., who has been president of the Electric Furnace Association during the past year, was elected president of the American Electrochemical Society to succeed Walter S. Landis. Other officers elected are: Vice-presidents, C. F. Burgess, Madison, Wis.; C. G. Schluederberg, Pittsburgh, and E. L. Crosby, Detroit Electric Furnace Co., Detroit; treasurer, P. G. Salom, Philadelphia; secretary, J. W. Richards, Lehigh University, Bethlehem, Pa.; managers, Carl Hering, consulting engineer, Philadelphia; J. V. N. Dorr, The Dorr Co., New York City, and F. A. FitzGerald, Niagara Falls, N. Y.

It was decided to hold the fall meeting at Lake Placid, N. Y., some time in September.

CLAIM ILLINOIS BILL REFLECTS IGNORANCE OF FACTS.

According to advices from Springfield, Ill., experts who have studied the utility bill, which was reported out of the House of Representatives Public Utilities Committee, allege that the bill reflects reckless disregard of the tangible investment of $1,250,000,000 in the public utilities of the state; that the "voting in or out" features of the bill would lead to endless, and costly, litigation; that the rights of 450,000 owners of public utilities securities of the state are left open to assault by demagogs and that were the bill passed, utility development in the state would be seriously interfered with and the public made to suffer great injury. Failure of the bill's authors to recognize that many communities are now served by the same utility—this applied to telephone, electric, gas and electric railway utilities—attracted much attention. With this situation existing, were large cities to vote to adopt home regulation over utilities, small communities unable financially to make attractive terms to the utilities, would at once be confronted with a serious dilemma and the movement towards further extension of services would end. With constant political fights on and the utilities back again in politics, from which they were removed when the state assumed full regulatory powers, it is declared that the flow of investment money into the state would be hampered and all business would greatly suffer.

The Illinois Chamber of Commerce, which represents 30,000 business men of the state, has sent a statement to members setting forth the dangers of the situation as affecting the welfare of the state. It advocates "home hearings" respecting utility matters, but declares that local regulation as provided under the so-called "home-rule" plan would result diastrously. The statement says: "We are strongly in favor of local home hearings and local appeals but our members oppose any provision that will drag the utilities into all our local elections. It is hoped that the legislature will give the people the advantage of local home hearings but that it will not throw the regulation of utilities back into the hands of city councils or make the question of utility regulation a matter to be brought up at every municipal election."

LIGHTING OF SCHOOL BUILDINGS DISCUSSED BY I. E. S.

The feature of the May 12 meeting of the New York Section of the Illuminating Engineering Society was a paper on "Lighting of School Buildings" by Frank H. Wood and Dr. William A. Howe, of the New York State Board of Education. George H. Stickney discussed the paper from the standpoint of the illuminating engineer, and Francis Y. Joannes discussed the subject from the viewpoint of the architect.

A. T. & T. CO. OFFERS NEW ISSUE TO ITS STOCKHOLDERS.

The directors of the American Telephone & Telegraph Co. voted May 10 to issue $90,000,000 of new stock, and offer it at par to stockholders of record May 20 in the ratio of one new share for each five shares held. The stock outstanding now amounts to about $445,000,000 and the new stock was provided for at the annual meeting a year ago, when the stockholders voted to increase the authorized capital stock from $500,000,000 to $750,000,000. Issuance of additional stock also was foreshadowed in March, when the directors increased the annual dividend rate from 8 to 9%. At that time it was stated the company would need considerable new capital to finance its normal

growth and that it was the policy to maintain a dividend rate that would maintain the market values of its stock and make offerings of new stock attractive to investors.

"The program since the period of federal control has been, first, to get the service up to pre-war standards, and, second, to get wages up to post-war standards," President H. B. Thayer said in commenting on the new stock issue. "Coincident with these moves and essential to them was an increase in revenue by raising rates. We were prepared, therefore, at the annual meeting in March to announce a change in our dividend rate to a post-war standard, which would make participation in the financing of the business desirable to our stockholders."

PUBLIC ENCOURAGEMENT NEEDED IN ELECTRICAL DEVELOPMENT.

In Address Before Chamber of Commerce of the United States E. N. Hurley, Former President of U. S. Shipping Board, Urges Co-operation.

America today is at the crossroads of electrical development and the question is whether we are to go forward or stand still, according to Edward N. Hurley, chairman of the U. S. Shipping Board during the war, who spoke at Atlantic City recently before the Chamber of Commerce of the United States. "At this moment the electrical industry is suffering from arrested development," said Mr. Hurley. "The industry is awaiting the verdict of the American people. There is no question, save the daily problem of food, clothing and shelter, which is so vital to the welfare of the American people. Upon the development of the electrical industry depends the extension of means of communication; further facilities for lighting and household conveniences; the spread of education, and the further progress of civilization.

"We like to think of ourselves here in America as the pioneers in the science of electricity. We have been the pioneers, but the job we started has not been half done. There are still 14,000,000 homes in the United States without electrical service and which eventually will have it. It is authentically stated that if the present problem of housing the population is to be met, the United States needs 1,500,000 additional homes, 500,000 additional factories, 5000 public schools, 5000 churches, 60,000 apartment buildings and 15,000 theaters. These, too, mean electric service. There are 150,000 pending applications for power by existing or new industrial plants desirous of utilizing electricity.

"We have come to think of electric light as the normal lighting for every home. We like to think that the women of the nation are no longer compelled to do the drudgery of the home—that electric power has taken a large part of the load from their backs. The fact is that the vast majority of people are still without the aid of electric current. There are literally millions who still read under smoky oil lamps. There are many industries burning coal and generating their own power, which more economically, could utilize electricity from the electric light and power plant and at the same time decrease the strain upon the nation's coal pile. The electrical industry must be operated in large units—the larger the unit, the greater the economy. Existing small units serving individual communities must be physically inter-connected to permit of more economical use of present capacity and with the ultimate purpose of building a single, great unit to replace the smaller ones as they become obsolescent. Electric power has ceased to become a local problem. It has become a state-wide and even an interstate problem. Unless the public, the state commissions and the utility corporations work together and create that confidence which will influence people to invest in utility securities, I am convinced that the nation within three years will fall so far behind in electrical development that it will be without sufficient current to provide for electrical home labor-saving devices, for unless capital investment can be encouraged through the creation of this confidence, the expansion of our industries will be seriously retarded."

On the question of municipal ownership, Mr. Hurley said: "In some sections of the country where misunderstandings have led to bitterness, people are advocating municipal ownership. Although at one time sympathetic towards government ownership, I am certain, after a number of years in government service, that no community can receive the industrial service to which it is entitled under municipal or governmental management. The cause for this fact lies in the human element. No city, state or national industrial enterprise can expect to obtain from management, or from men, an average of more than 50% of personal efficiency, or more than 50% of personal interest in their work, and it must be remembered that this percentage will gradually decrease the longer the individual manager or the individual employe is in this industrial government service. It is not humanely possible to obtain the same effort or interest from managers or men employed in industrial government service that exists in competitive private ownership, and if advocates of government ownership investigate the facts carefully and impartially, they will find that government operation in industrial service is a flat failure from a 'service to the public' standpoint. This is true not only in America, but it is a proven fact throughout the world."

MEETING FOR METERMEN AT N. E. L. A. ANNUAL CONVENTION.

Plans have been perfected by the Meter Committee of the National Electric Light Association to hold a dinner in Chicago during the annual convention of the Association. The dinner is scheduled for Tuesday evening, May 31, 6 p. m. to 8:15 p. m. It will be open to all metermen attending the National convention of the Association, its object being to get the men together for a frank discussion on the Meter Committee's report. Those who wish to attend this dinner should mention it at the time they register at the convention. The place at which the dinner will be held will be announced later.

JOBBERS' ASSOCIATION TO MEET.

The Westinghouse Agents-Jobbers' Association will hold its annual meeting at The Homestead, Hot Springs, Va., May 17-21. The present officers of the Association are: President, F. E.

Stow, Philadelphia; vice-president, John J. Gibson, East Pittsburgh, Pa.; secretary, C. C. Blackwell, Birmingham, Ala.; assistant secretary, H. T. Pritchard, East Pittsburgh, Pa.; treasurer, J. E. McClernon, New York City, and counsel, J. J. Jackson, East Pittsburgh, Pa.

WESTERN SOCIETY OF ENGINEERS ELECTS OFFICERS.

At the recent meeting of the Western Society of Engineers the following officers were elected: President, Charles H. MacDowell, president of the Armour Fertilizer Works; first vice-president, Julius L. Hecht, assistant to the vice-president, Public Service Co. of Northern Illinois; second vice-president, F. F. Fowle, consulting electrical and mechanical engineer; third vice-president, Benjamin B. Shapiro, consulting structural engineer; treasurer, Homer E. Niesz, manager of Industrial Relations, Commonwealth Edison Co., and trustee, Edwin E. Allen, assistant district manager and district engineer of the General Electric Co. The members of the Washington Award Commission are: John F. Hayford, director of the School of Engineering, Northwestern University, and Henry J. Burt, manager of Holabird & Roche. The officers elected will take office on the first Wednesday in June.

TO DISCUSS ELECTRICAL HAZARDS AND SAFEGUARDS.

Electrical hazards and their safeguards will be discussed at the meeting of the American Society of Safety Engineers, to be held in the Engineering Societies building, New York City, May 27. The following papers will be read: "High Tension Electric Generation and Transmission" by C. O. Van Dannenberg and W. W. Samuels, electrical engineers, J. G. White Engineering Corp., New York City; "Electrical Hazards—Terminal Equipment of the New York Central Railroad Entering New York City," by H. S. Balliet, assistant terminal manager, Grand Central Station, and "Small Motor Problems and Industrial Control," by L. E. Smith, electrical engineer, General Electric Co.

"WHITE WAY" ANNIVERSARY.

The widely advertised "white way" of Broadway, New York City, celebrated its 30th anniversary during the last week of April. Thirty years ago the first electrically operated display sign was placed on the Flatiron building, Fifth avenue, Broadway and 23d street, promoting Manhattan Beach as being, "Swept by Ocean Breezes." The first "flasher" signs on Broadway were operated by a shift of electricians pulling switches at a board from dusk until midnight.

E. A. N. S. ELECTS OFFICERS.

At the first annual meeting of the Electrical Association of Nova Scotia held in Halifax last month, the following officers were elected: President, W. Murdock, manager of the Northern Electric Co., Ltd., Halifax; vice-president, P. R. Colpitt, city electrician, Halifax, and honorary secretary-treasurer, J. T. Dorey, president of Dorey Electrics, Ltd., Halifax.

COMING CONVENTIONS.

American Washing Machine Manufacturers' Association. Meeting at Sherman Hotel, Chicago, May 18-19. Secretary, Enoch B. Seitz, Otis building, Chicago.

Southwestern Electrical and Gas Association. Annual convention, Galveston, Tex., May 18-21. Headquarters, Hotel Galvez. Secretary, H. S. Cooper, 403 Slaughter building, Dallas, Tex.

National Electrical Credit Association. Annual meeting, Richmond, Va., May 19-20. Headquarters, Hotel Jefferson. Secretary, Frederic P. Vose, Marquette building, Chicago.

American Institute of Electrical Engineers. Annual meeting, Engineering Societies building, New York City, May 20. Secretary, F. L. Hutchinson, 33 West 39th street, New York City.

American Society of Mechanical Engineers. Spring meeting, Chicago, May 23-26. Headquarters, Congress Hotel. Assistant secretary, C. E. Davies, 29 West 39th street, New York City.

International Railway Fuel Association. Annual convention, Chicago, May 24-26. Headquarters, Hotel Sherman. Secretary, J. G. Crawford, 702 East 51st street, Chicago.

Stoker Manufacturers Association. Annual meeting, Stockbridge, Mass., May 24-26. Headquarters, Red Lion Inn. Chairman of Publicity Committee, R. C. Beadle, 11 Broadway, New York City.

Electrical Supply Jobbers' Association. Thirteenth annual meeting, Hot Springs, Va., May 25-27. Headquarters, The Homestead. General secretary, Franklin Overbagh, 411 South Clinton street, Chicago.

Pacific Coast Geographic Division of the National Electric Light Association. Annual convention, Del Monte, Cal., May 25-27. Headquarters, Hotel Del Monte. Secretary, L. H. Newbert, 445 Sutter street, San Francisco.

National Electrical Light Association. Annual convention, Chicago, May 31-June 3. Headquarters, Drake Hotel. Executive manager, M. H. Aylesworth, 29 West 39th street, New York City.

New York State Association, National Association of Stationary Engineers. Annual convention, New York City, June 9-11. Headquarters, Hotel McAlpin, 34th street and Broadway. Secretary, E. Davies, 1379 St. Johns place, Brooklyn, N. Y.

National Fire Protection Association. Annual convention, San Francisco, June 14-16. Secretary, Franklin H. Wentworth, 87 Milk street, Boston.

Tri-State Water and Light Association. Annual convention, Asheville, N. C., June 15-16. Secretary, W. F. Steiglitz, Columbia, S. C.

Northwest Power and Light Association. Annual convention, Portland, Ore., June 15-17.

Canadian Electrical Association. Annual convention, Quebec City, June 15-17. Secretary, Eugene Vinet, Power building, Montreal, Que.

American Society for Testing Materials. Annual convention, Asbury Park, N. J., June 20-24. Headquarters, New Monterey Hotel. Secretary, C. L. Warwick, 1315 Spruce street, Philadelphia.

American Institute of Electrical Engineers. Annual convention jointly with the Pacific Coast convention, Salt Lake City, Utah, June 20-25. Secretary, F. L. Hutchinson, 33 West 39th street, New York City.

North Central Geographic Division of the National Electric Light Association. Next convention, Duluth, Minn., June 21-23. Headquarters, Spaulding Hotel. Secretary, H. E. Young, 15 South Fifth street, Minneapolis, Minn.

National Association of Electrical Contractors and Dealers. Anniversary convention, Buffalo, N. Y., July 18-23. Headquarters, Lafayette Hotel. Secretary, W. H. Morton, 110 West 40th street, New York City.

Pennsylvania State Association of Electrical Contractors and Dealers. Semi-annual meeting, Buffalo, N. Y., July 19. Headquarters, Lafayette Hotel. Secretary, M. G. Sellers, 1518 Sansom street, Philadelphia.

COMMERCIAL PRACTICE

New Business Methods, Policies, Rates and Kindred Central-Station Matters for the Man Engaged in Selling Electricity

SCHOOL OF ELECTRICITY STARTED BY OKLAHOMA UTILITY.

Following the successful information course conducted by the Oklahoma Gas & Electric Co. in the summer of 1920 for the company's employes, the enthusiasm of the students and officers of the company was so great that it was decided to conduct another and longer course on the subject of electricity. After an extensive investigation a correspondence course was selected and offered to the employes at cost ($75 each). The initial enrollment was 57 and it is expected that at least 20 more employes will join later. The company paid for the courses in advance and (at the option of the employes) will deduct $5 each month from their salary checks until paid for.

Classes will meet once each week in the employes clubrooms and all employes who complete the course will receive a refund from the company of $37.50. A place is provided in the club rooms for the employes to study and work on their lessons, and arrangements are being made so that when particular mechanisms are being studied, such as motors, batteries, etc., actual working models or machines will be on hand. Future courses are planned and will include the subjects of lighting, heating, boilers, engines, etc.

ELECTRIC SERVICE, A TWENTIETH CENTURY COMMODITY.

Value of Electricity in Industry—Missionary Work Needed to Acquaint Public With Knowledge of Central-Station Problems.

By Joseph A. McAteer,
Duquesne Light Co., Pittsburgh.

Service is the commodity of the 20th century, the perfection of which is the aim of every intelligent and up-to-date business organization in this or any other country. It is just as much typical of the modern business world as the huge skyscraper is of the advance in building construction, as the palatial ocean liner is of modern navigation, or as the electrically-driven solid vestibule Pullman train is of the rapid strides made in transportation.

Due to the gradual evolution in the life and customs of man we know that the things which were satisfactory to the man of yesterday hold no promise for today, luxuries are rapidly becoming necessities and other new and more interesting and satisfying things are taking their places only to fall into the same old channel tomorrow. The best definition of service would seem to be the inscription one sees over the desk of many business men—"I want what I want when I want it," to which might be added "and how I want it." Service enters into every business today; as we formerly understood the term it centered on the work or the efforts of professional men, doctors, lawyers, and others of this type. There is no business today which does not possess the element of service and in proportion to the part which service plays in that business in the same proportion is success guaranteed.

We may find this old world moves along very slowly, and yet changes in the modes, customs and habits of the people follow each other in rapid succession. If one were to retire from the busy world for a year or two, his return to active participation in its affairs would find him very much at sea and entirely out of touch with its problems. Service enters into the manufacture, sale and delivery of every commodity. The market basket of yesterday is replaced with the delivery wagon of today. Housewives no longer go to the corner grocery store, the market or the department store and return home loaded down with the day's purchases. The delivery service has eliminated this useless work; she steps to the telephone and orders her grocery needs; she may do the same with her larger purchases, or do her shopping in person. But the delivery truck promptly delivers the goods. So it is we use the telephone, the electric current, the streetcar, the taxicab, and a hundred and one other services great and small which the world knew little or nothing about 25 yrs. ago. The natural human desire for greater enjoyment of life, greater ease and comfort prompts us to stretch out for any new service within our means which will aid us in elevating our mode of living.

Mission of Electricity Is to Promote Efficiency of Human Effort.

There is perhaps no service which enters into the everyday life of so large a proportion of the world's population as that well known and yet mysterious power electricity. Its mission is the elimination of unnecessary work, the greatest efficiency of human effort and the advancement of the happiness and prosperity of the individual. From a mere infant in the industrial world it has grown within the last 20 yrs. into one of the industrial giants. From the time the average individual rises in the morning until he rests his head on the pillow again at night—through all the operations and processes of the day's work or play—electric service is ever at his elbow, ministering to his every need like a faithful servant. Perhaps it is the streetcar, the telegraph, or a thousand and one other things which come to his aid in the 24 hrs., the motive power for all of which is this wonderful thing we call electricity.

It is very easy to forget that all of these numerous aids to human happiness did not come about through a mere wave of the hand. First it was the brains and the energy of the great inventors and scientists who spent their lives for the thing they pictured in their dreams; next it was the financiers and business men who realized

the wonderful future of electricity and were not afraid to spend the millions of dollars necessary to achieve the results which we see today. And finally it was the engineers and workmen who braved the elements and faced the hazards to bring about the reality. We are very prone to take things for granted and to assume that because certain things exist they follow the natural order and just happen—just as Topsy said "she just growd." In the world of finance we hear of big dividends; politicians and agitators rave about watered stock and the man who can make a fine speech denouncing some industry or corporation has no trouble in getting a large audience. Very rarely do we recognize the financial hazards in the establishment of large industries, the years when everything is going out and nothing coming in, when the balance sheets always show deficits and when considerable worry and much manipulation of finances is necessary to meet the bills. It often happens that it takes a good many extra dividends to make up the heavy losses of early days.

Then again we are prone to forget the physical efforts necessary to the services we demand. It is only natural for us to fall short of the proper appreciation of a thing until that thing is taken away from us. Thus we fail to realize the multitudinous operations necessary in the delivery of electric service; the generating stations, the transmission lines, the substations, the distribution lines, the meters, transformers, service lines and wires, representing millions of dollars of investment, the thousands of employes necessary for their operation and maintenance and with the several hundred thousand possible points of interruption, any one of which may involve one or 1000 customers.

Central-station employes themselves often fail to recognize these facts and are so busy with the details of their part of the ring that they lose sight of the general objective. A proper appreciation of the entire problem will prove beneficial and will enable them to handle their own problems much more satisfactorily. On the part of the company and the employes a more general realization of the fact that the highest type of service is possible only through the co-ordinated efforts of every department, section and individual, will do much to make that service a fact and thus it will be easier for every central-station man to sell central-station service, and what it means, to his neighbor and the general public, which is the target we are shooting at. Missionary work along these lines is what the industry needs to acquaint the public with a correct knowledge of our problems.

REPRESENTATIVES OF INVESTMENT DEPARTMENT APPOINTED.

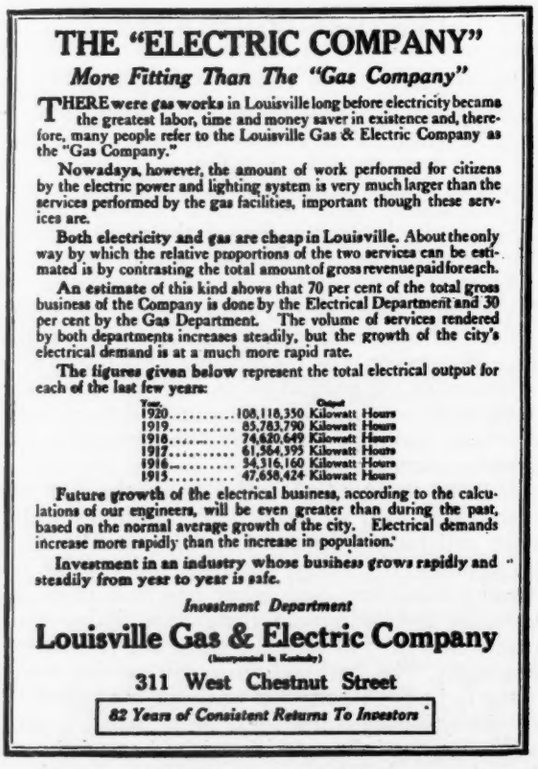
The investment department of the Public Service Co. of Northern Illinois, Chicago, has appointed the following direct representatives in the towns named: H. R. Dewitt in Chicago Heights; J. G. Holland in Evanston, and W. F. Lowery in Oak Park. These subordinate organizations of the parent body are now in operation. The new arrangement is made with the purpose in view of intensifying the efforts of the investment department in the specific localities involved. These representatives will direct the sales of securities handled by the investment department each in his own territory, and will arrange meetings necessary to the distribution of information and the handling of essential details. Members of the company's organization will be continued as the selling force.

FIGURES ON CUSTOMER-OWNERSHIP SALES FOR LAST YEAR.

Total customer-ownership sales of the preferred stock of Byllesby electric and gas companies will run about $6,200,000 par value for 1920, compared with $3,388,100 in 1919, a gain of 83%. The companies which sold their securities direct to their customers were: The Northern States Power Co.; Louisville Gas & Electric Co.; Arkansas Valley Railway, Light & Power Co.; Oklahoma Gas & Electric Co.; Western States Gas & Electric Co.; San Diego Consolidated Gas & Electric Co.; Mountain States Power Co. and the Tacoma Gas & Fuel Co. These companies during the past few years have distributed upwards of $14,500,000 of their securities among more than 20,000 of the people to whom they supply electricity and gas services.

UTILITY'S GROWTH MADE BASIS OF LOCAL ADVERTISING.

In connection with its customer-ownership plan, the Louisville (Ky.) Gas & Electric Co. recently utilized advertising space in the local newspapers, in which it called attention to the percentage of business done by the electrical and gas departments, and also presented figures giving the total electrical output for the years 1915 to 1920 inclusive.



THE "ELECTRIC COMPANY"

More Fitting Than The "Gas Company"

THERE were gas works in Louisville long before electricity became the greatest labor, time and money saver in existence and, therefore, many people refer to the Louisville Gas & Electric Company as the "Gas Company."

Nowadays, however, the amount of work performed for citizens by the electric power and lighting system is very much larger than the services performed by the gas facilities, important though these services are.

Both electricity and gas are cheap in Louisville. About the only way by which the relative proportions of the two services can be estimated is by contrasting the total amount of gross revenue paid for each.

An estimate of this kind shows that 70 per cent of the total gross business of the Company is done by the Electrical Department and 30 per cent by the Gas Department. The volume of services rendered by both departments increases steadily, but the growth of the city's electrical demand is at a much more rapid rate.

The figures given below represent the total electrical output for each of the last few years:

Year	Output
1920	108,116,350 Kilowatt Hours
1919	85,783,790 Kilowatt Hours
1918	74,620,649 Kilowatt Hours
1917	61,564,395 Kilowatt Hours
1916	54,316,160 Kilowatt Hours
1915	47,658,424 Kilowatt Hours

Future growth of the electrical business, according to the calculations of our engineers, will be even greater than during the past, based on the normal average growth of the city. Electrical demands increase more rapidly than the increase in population.

Investment in an industry whose business grows rapidly and steadily from year to year is safe.

Investment Department

Louisville Gas & Electric Company

(Incorporated in Kentucky)

311 West Chestnut Street

82 Years of Consistent Returns To Investors

Sample of Local Advertising Matter Used by the Louisville Gas & Electric Co.

APPLIANCES and DEVELOPMENTS

New, Improved or Interesting Electrical and Mechanical Apparatus and Devices, and Applications of Equipment and Methods in Practice

Colored Light for Show Window Illumination.

The Ivanhoe Rainbow window lighting equipment is being placed on the market by the Ivanhoe-Regent Works of General Electric Co., Cleveland, O., to meet the demand for equipment which is simple in construction and efficient in

Ivanhoe Rainbow Window-Lighting Equipment.

operation for either white or colored illumination. An outstanding feature of the Ivanhoe Rainbow is the use of colored glass caps which fit over the lamp for obtaining color changes. These caps are supplied in red, amber, green and blue with which colors any desired shading or contrast may be secured; the use of this type of color screen permits of continuous operation and frequent handling without effecting the serviceableness of the equipment.

The reflector used is a specially designed prismatic glass type of high efficiency, accommodating the 100 to 150-watt lamps. The holder and reflector design permits the use of two positions for the reflector, giving flexibility of installation for different window proportions or to accommodate varying styles of window trims. The holder supports the reflector firmly, but flexibly by means of spring legs instead of set screws. These same legs also serve for attaching the color caps. The construction of the holder and cap prevents escape of white light in any direction when the color caps are used, at the same time providing sufficient ventilation to insure long life to the lamp.

Still another feature of design found only in this unit is shown in the neck of the reflector which is slotted in such a way that when once installed the reflector cannot be accidently turned out of position when cleaning the equipment or while hanging lamps or color caps. The construction and assembly of the unit is extremely simple and the small size of the color caps, together with the ease with which they may be attached or interchanged, makes the use of the equipment very convenient. The prismatic glass reflector used in this equipment is manufactured especially for this purpose.

Diningroom Dome with Decorated Glass Panels.

Since the Kramerlite Co., Inc., 577 Broadway, New York City, believes that harmonious lighting effects and fixtures make the home restful and cheery, the "Kramerlite" diningroom candelabra unit has been developed to promote this idea. This fixture has three candle lights and a dome with hand-decorated glass panels. The dome is finished in a background of brown, old rose, or mulberry, while the design thereon is polychrome in color, the whole being made to match harmoniously the color scheme of any room. This company also manufactures a complete line of distinctive lighting effects in art bent glass.

An Excellent Home or Office Illuminator.

A flood of brilliant light without glare is a feature of the Hexalite Jr. ceiling lighting unit made by the Empire Lighting Fixture Co., 224 Centre street, New York City. This fixture is constructed of especially designed glass of hexagonal form and reflectors which soften the illumination but do

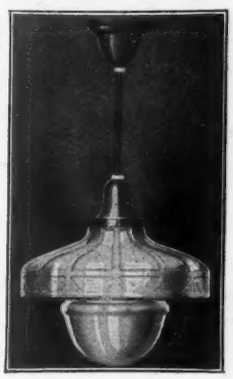
Hexalite Jr. Lighting Unit.

not reduce the intensity. The metal parts are finished either in ivory gold or Japanese bronze and the unit is equipped with a pull socket.

Lighting Unit Embodying New Type Holder.

The "Day-Glow" lighting unit, manufactured by the Luminous Specialty Co., 236 South Meridian street, Indianapolis, Ind., embodies a new type holder which engages the bowl so firmly that no vibration or jar can dislodge it. The holder is so arranged that the whole unit can be lifted by placing the hand under the bowl itself, and yet the bowl can be removed and replaced instantly, obtaining at the same time perfect alignment with the upper shade.

The manufacturer states that the



The "Day-Glow" Unit.

"Day-Glow" unit provides proper illumination, producing a soft diffused light free from glare and hard contrasting shadows. The light absorbed is approximately 10%, while the increase in useful illumination is over 25%.

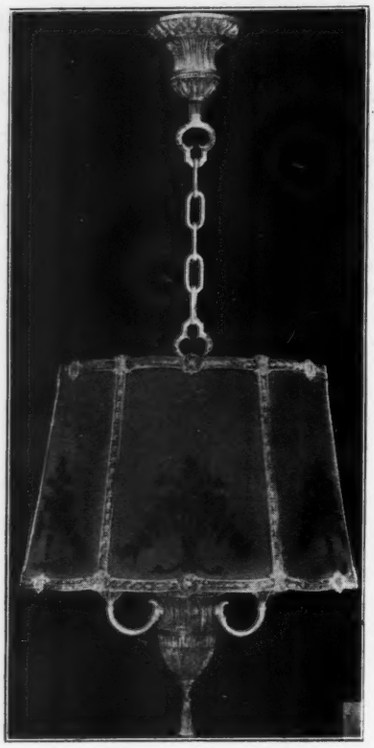
"Brascolite" Bulletin Illustrates Hospital Lighting.

The Luminous Unit Co. Division of the St. Louis Brass Manufacturing Co., St. Louis, has issued architectural series bulletin No. 1, showing various hospitals that are equipped with "Brascolites," "Aglites," and other Luminous Unit Co. products. The statement is made that modern science has shown that the activities in the hospital are more dependent on good lighting than anything else, yet it is understood that less than 10% of the hospitals in this country are properly lighted. This is not entirely due to lack of interest in the institution by the architects, superintendents, doctors, etc., but very largely to the fact that they have not realized that good lighting is the most essential feature to be considered. Where sanitation, safety and accuracy are requisite features of hospital work, it can readily be seen that proper lighting is of paramount importance.

Diningroom Fixture with Glass-Panel Shade.

While a silk or parchment shade on an electrical fixture adds an artistic effect to the decorations of a room, it does not give lengthy service in use due to the material creasing, cutting and collecting dust. To retain the desirable features of these shades with

the addition of durability, Bauman & Loeb, 138 Bowery, New York City, has equipped the B & L No. 1000 diningroom fixture with a shade made in



No. 1000 Diningroom Fixture.

glass panels, ribbed, decorated and colored on the surface and specially treated to withstand washing and frictional wear. This unit is a candle dome type of 54 ins. in length and 20 ins. spread and so constructed that in case of breakage the glass panels of the shade can be replaced or other designs substituted when desired. This fixture is packed complete in an individual corrugated carton, crated to insure safe shipment and convenient for the contractor-dealer to handle for storage or reshipment.

This company also manufactures the B & L No. 2400 line of fixtures, made in a combination of cast and heavy spunned metal, finished in Jap gold, Etruscan gold, silver and black. These are 1-, 2-, 3-, 4-, and 5-light ceiling fixtures and 1- and 2-light side brackets for household use of exclusive and artistic designs.

Luminous Type of Reflectors for Industrial Plants.

Industrial lighting requirements have developed a demand for a reflector which emits a portion of the light in an upward direction, illuminating to a moderate degree the space above the fixture. Some of the illumination directed downward in the ordinary type of industrial lighting fixtures is reflected upward from the floor and wall of the shop, but there are several reasons why more light must be supplied above the fixture. In the first place, there must be sufficient overhead lighting in order that workmen may safely make repairs on line shafting, belts, etc., where such equipment exists. Secondly, the contrast in lighting intensities above and below the unit should be a minimum in order to eliminate a glaring effect in viewing the reflector. However, this condition is usually to be considered only under saw-tooth or other irregular type of roof construction. Furthermore, lighting is needed above the fixture in order to overcome the impression of the lowered ceiling and less overhead freedom. This impression is experienced when there is a decided contrast below and above the hanging height.

To take care of this situation, the Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa., has placed upon the market a luminous type reflector which is noted for its simplicity, mechanical strength and low maintenance cost. This unit is easy to wire, which allows a minimum installation cost. There is a complete interchangeability of parts which also makes for low maintenance. The device consists of three main parts which makes for easy assembly.

"Kantshok" Safety Entrance for Service Connections.

The Lewis Electric Co., Canton, O., is manufacturing a safety service entrance known to the trade by the name "Kantshok." An adjustable meter trim provides for the inclosing of wires from the main switch to the meter, and an L-shaped extra door covers the openings through which fuse renewals may be made. The regular door is provided with means for locking or sealing, as desired, to protect the wiring and prevent access to the main switch without a key or the breaking of the seal. Such a device protects both the customer and the company supplying service, and is said to prove quite economical to install.

Line of Lighting Fixtures with Distinctive Feature.

Moon-Glow lighting fixtures are a new line manufactured by the Rogers Silver Plate Co., Danbury, Conn., and distributed by the Eclipse Light Co., 587 Broadway, New York City. The distinctive feature is the Cupid-on-the-Moon central portion which when illuminated provides a soft silvery moonlight. The 2-light drop shade fixture is made with a 9- or 12-in.

Moon-Glow Lighting Fixture No. 1 M-G.

diam. moon, while in the four candle style, only a 12-in. diam. moon is procurable. All types are finished in either 22-karat gold plate or sterling silver and the overall length is 36 ins. The moon is furnished with trans-

Moon-Glow Lighting Fixture No. 2 M-G.

lucent amber art glass or decorated parchment and one or more lights are placed within the moon effect and two or more outside for general illumination. Bracket fixtures to match are also obtainable.

Portable Sign for Office and Store Use.

A portable sign unit has been placed on the market by the Economical Electric Lamp Division, National Lamp Works of General Electric Co., 25 West Broadway, New York City. The unit is complete, and includes enameled metal case, aluminum face plate,

Portable Sign Unit.

letters and numbers. This unit is finding a ready use among professional men who place it on the window sash as a visible illumination to indicate the name, office hours and location. It is also used in stores and offices to indicate various departments. Here it may be fastened permanently or suspended from a bracket.

The Economical Electric Lamp Division is also merchandising a house number lighting and bell-ringing unit by means of which a residence is easily located at night and the door-bell made independent of dry batteries.

Two New Types of "Baby Denzar" Lighting Units.

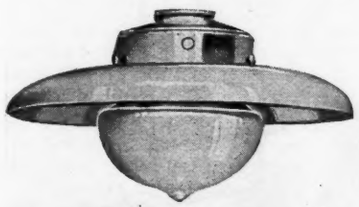
Every woman who has prepared a meal at the kitchen stove or who has washed dishes at the kitchen sink, knows the annoyance and handicap of standing in her own shadow. She

has been forced to do this because the average kitchen light is not only hung too low, but is insufficient in candlepower and does not furnish an evenly distributed light throughout the room.

No. 475 Ceiling Type "Denzar" Lighting Unit.

Realizing the need of a good light for the kitchen and scores of other places where a single good unit of not more than 100 watts is required, the Beardslee Chandelier Manufacturing Co., 216 South Jefferson street, Chicago, developed the "Baby Denzar." It is made in two types: The compact ceiling type, for installation at ceiling outlets, and the replacement type, which may be attached directly on any pendant or ceiling fixture which is equipped with a 2¼-in. shade holder. The compact ceiling type is exactly like the regular compact ceiling type "Denzar" except that, as its name suggests, it is smaller in size.

Both types of "Baby Denzar" will accommodate either the 75 or 100-watt mazda C lamp and they make admirable lighting units for kitchens, private game rooms, doctors' and dentists' offices, candy kitchens, butchers' refrigerators, and numerous locations about the modern hotel such as sample rooms, trunk rooms, soda fountains, cardrooms, servants' diningrooms, pantries, coffee shops, small bedrooms, hallways, etc. The accompanying illustrations show the design of both types of "Baby Denzar." They are equipped with 12-in. reflecting domes and 6-in. "Denzar" bowls and are packed in individual labeled cartons to prevent breakage and to facilitate storage. They have all of the distinctive features of the regular



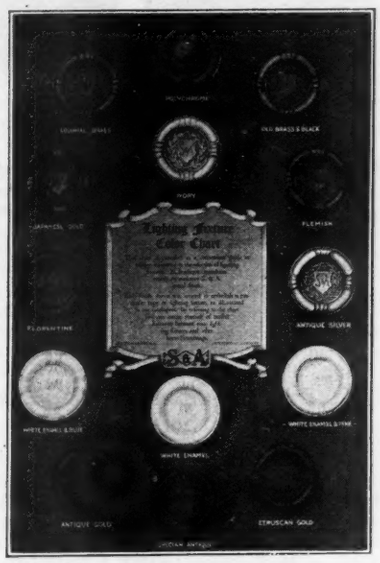
No. 475R "Baby Denzar" Unit.

type "Denzar." It is claimed that the bright soft light from "Denzar" is exceptionally pleasing because this scientifically-designed unit does not produce any bright spots, glare, or harsh shadows. It is particularly restful for either work or play and its success as a commercial lighting unit can be proven by numerous installations in stores, schools, offices, banks, and public buildings in practically every state east of the Rocky mountains.

Show Types of Fixture Finish by Color Chart.

Those interested in the selection of lighting fixtures will appreciate the color chart now being distributed by Shapiro & Aronson, Inc., 20 Warren street, New York City. This chart, handsomely designed and executed by the Odets Printing Co., bears a set of embossed and appropriately tinted plaques, each giving an exact reproduction of an exclusive "S. & A." metal finish created to embellish a particular type of lighting fixture manufactured by this company and illustrated in the catalogs accompanying the chart. By referring to the chart one can be assured of perfect harmony between the lighting fixture and the other home furnishings when the selection is being made.

This is said to be the first example of such service to aid the dealer and purchaser in choosing the appropriate finish for the lighting fixture to match its surroundings in each room of the home, the various finishes being shown on the chart

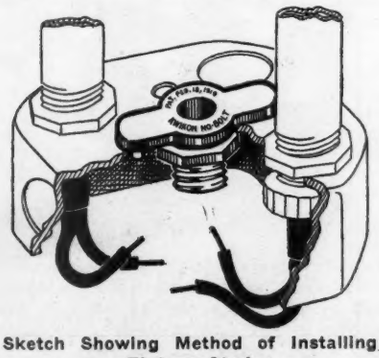


Study in Black and White of the S. & A. Color Chart.

in their natural tones. This service will in all probability find a ready welcome among the dealers.

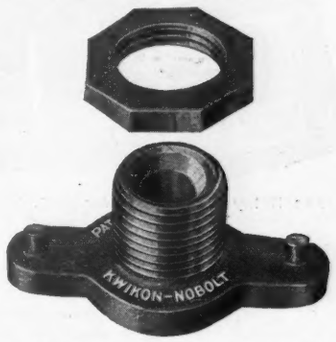
Fixture Stud Designed for Conduit Work.

There has recently been placed on the market by S. R. Fralick & Co., 15 South Clinton street, Chicago, the new Kwikon "No-Bolt" fixture stud



Sketch Showing Method of Installing Fixture Stud.

designed for conduit work. As shown by the illustration this stud is installed without the use of bolts. The method of installation is simple and easy. The stud is placed on the back of the outlet box with the threaded shank ex-



New Kwikon "No-Bolt" Fixture Stud.

tending through the center knockout. The two small pins on either end of the base register with the bolt holes of the box and prevent turning. A locknut, furnished with each stud is run onto the shank and holds the stud and box firmly together, as if in one piece.

In this way the fixture is supported by the entire box rather than by two small bolts and inasmuch as the threaded shank is the only part that extends into the box a great deal more space is left for wiring and any necessary joints. It is also stated that the Kwikon "No-Bolt" stud may be installed in less time than required by many other types.

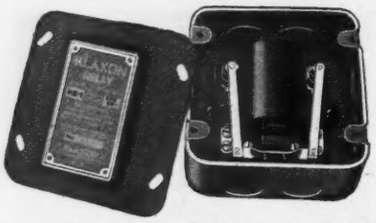
An added feature of this stud is that it may also be used to support the outlet box. The center of the shank is open and countersunk at the top, which allows a No. 14 wood screw to be run through and fastened to the backing. The Kwikon "No-Bolt" studs are furnished in all standard sizes. They are galvanized to prevent rusting and are packed in cartons, five cartons in a special corrugated container forming the standard package quantity.

Klaxon Relays Electromagnetically Operated.

Because relays are useful for innumerable specific purposes, and the field of application is so diversified, it is important that their construction and design be such as to insure dependability. The Klaxon Co., Newark, N. J., has recently put on the market two Klaxon relays—Type HB-1 and HE-1—to meet the most rigid conditions of operation. They are inclosed in a stamped steel housing, provided with knockouts all around for ½-in. conduit and may be mounted upon wall or ceiling.

The type HB-1 is 3¾ ins. wide, 3 7/16 ins. high and 2⅜ ins. deep, weighs 3¾ lbs. and will operate from alternating current of bell-ringing transformer or standard light and power voltages with a power consumption of 5 to 8 watts. For direct current the type HC-1 which will operate from a standard battery or light and power voltages should be used and its power consumption is 2 to 3.5 watts. The Klaxon relays are electromagnetically operated. The switch arm is closed

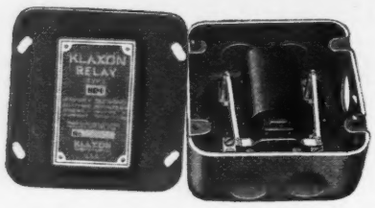
and held closed by electromagnetic action and opened and kept open by gravity. After a test of 170,000 operations, no "chattering" had occurred



Klaxon Relay Type HB-1 for A-C. Work.

and not the slightest change in its operating efficiency was detectable.

The Klaxon telephone extension relay or type HE-1 is sensitive enough both mechanically and electrically to close even light and power circuits firmly and without "chattering." It will make and break circuits up to 250 volts a. c. or d. c. and its maximum wattage capacity is 125 watts while its maximum current capacity is 10 amperes. The impedance is in excess of 9000 ohms and the resistance is



Klaxon Telephone Extension Relay Type HE-1.

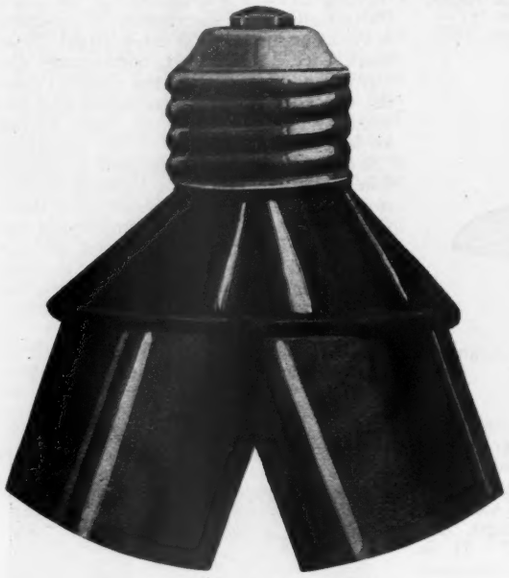
1000 ohms. This relay may be used to close a second relay where the telephone ringing current has not enough energy to operate a more powerful signal than a bell and thereby permits the use of the former signal by overcoming the previous chief obstacle to the arrangement.

New Types of Twin and Extension Sockets.

The Anylite Electric Co., 1500 Wall street, Fort Wayne, Ind., has recently placed on the market two new devices

"Anylite" Extension Socket.

to meet the popular demand for electric light sockets. The "Anylite" twin socket is designed along new mechanical principles to withstand the hardest kind of usage. It is neat and efficient. The "Anylite" extension socket is made in two types, one 4 ins. long and the other 2 ins. in length.



"Anylite" Twin Socket.

Their use makes it possible to connect the vacuum cleaner, toaster, percolator or other electrical appliance without removing the shade, and the manufacturer states that all danger of shock is eliminated. The company also manufactures the "Anylite" regulator, which was designed for devices consuming not more than 40 watts of current.

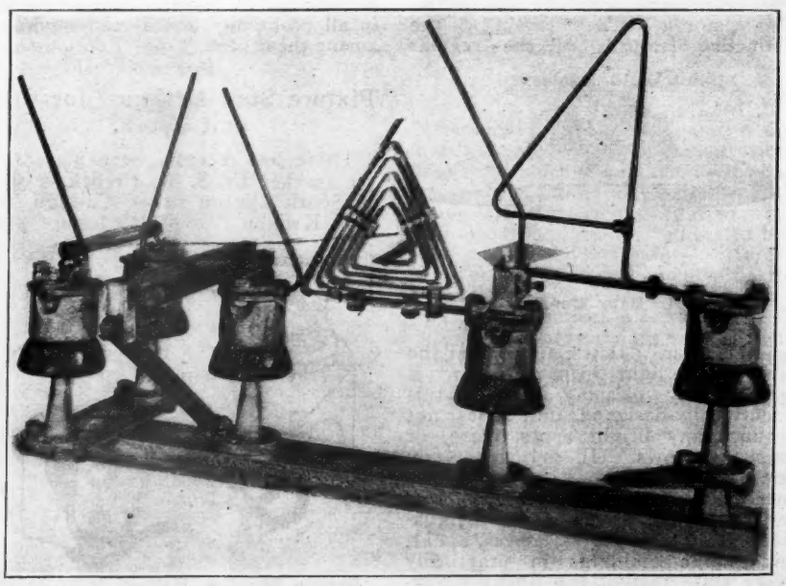
Unit-Type Equipment for Farm Line Service.

The Railway and Industrial Engineering Co., Greensburg, Pa., has recently developed and placed on the market a farm-line equipment, some of the interesting features of which are a horn-gap switch, triangular choke coil, lightning arrester and horn-gap fuse. All of these parts are combined as a single unit on one base, making a compact and complete single-pole equipment. Two single-pole units are mounted on one set of crossarms, the transformer being also mounted on the same crossarms. Minimum gaining and drilling of the pole is required, the arrangement throughout making it possible to install the complete equipment with a minimum amount of field work.

The air-brake switch is equipped with arcing horns protecting the main contact, which is covered by a sleet hood, from all arcing or burning. The switch is mechanically interlocked for simultaneous operation by a single operating handle placed on the pole within easy reach from the ground. The operating handle can be locked in open or closed position. The choke coil is of the triangular type and is combined with the lightning arrester, forming a straight-line discharge path for surges. A resistance unit is permanently connected in the ground side of the lightning arrester to limit the flow of dynamic current on a discharge. The fuse is of the reliable horn-gap type and is provided with glass cartridge link.

Usefulness of Automatic Counting Machines Described.

To meet the demands from busy men in every branch of industry for information as to the possibilities of the usefulness of automatic counting machines, The Root Co., Bristol, Conn., for 30 yrs. a pioneer in their manufacture, has had compiled a book called "The Census Takers of Industry," which is replete with suggestions and illustrates the versatility of these little machines in their ability to remove the human element from counting operations.



Farm-Line Equipment Built for 7500-Volt Service.

ACTIVITIES IN THE TRADE

Business Developments, Sales Agencies, Trade Literature and Miscellaneous Items Concerning Electrical Manufacturers and Allied Business Interests

Electrical Equipment Co., New York City, has leased property at 13 West 35th street for a local establishment.

Universal Battery Co., 3410 South LaSalle street, Chicago, has issued a catalog covering its "Universal" type of batteries.

Finch Radio Electric Corp., Buffalo, N. Y., has filed notice of increase in its capital stock from $10,000 to $500,000 for expansion.

Chicago Fuse Manufacturing Co., has leased space in the building at 105 West 40th street, New York City, for local headquarters.

Lundin Electric & Machine Co., New Haven, Conn., has arranged for an increase in its capital stock to total $80,000, for expansion.

Fulton Iron Works Co., St. Louis, has issued bulletins No. 801 describing and illustrating the Fulton Diesel oil engine manufactured by it.

National Wiring & Protective Co., Brooklyn, N. Y., has filed notice of increase in its capital stock from $6000 to $50,000 for general expansion.

Bristol Co., Waterbury, Conn., manufacturer of electric measuring instruments, has filed notice of increase in its capital stock to $2,500,000.

Cook Electric Co., 360-64 Jelliff avenue, Newark, N. J., has filed plans for the erection of a 1-story plant addition, 40 by 75 ft., to cost about $20,000.

Westinghouse Electric & Manufacturing Co., Newark, N. J., has filed plans for alterations in one of its buildings at the plant at 57 Orange street.

World Lighting Appliance Co., New York City, manufacturer of electrical equipment, has filed notice of increase in its capital stock from $15,000 to $50,000.

Triumph Electric Co., Cincinnati, has issued bulletin No. 2008 describing its type "TR" self-starting automatically operated polyphase induction motors.

Green Fuel Economizer Co., Beacon, N. Y., will hereafter maintain a sales office at 90 West street, New York City. The general sales offices will be located at Beacon.

W. E. Quimby, 209 Parkhurst street, Newark, N. J., manufacturer of electric pumps, etc., has filed plans for the construction of a 2-story addition, 40 by 96 ft., to cost about $25,000.

Crouse-Hinds Co., Syracuse, N. Y., has issued an illustrated folder covering its plug receptacle housings, safety switch condulets and safety motor-starting switch condulets.

Kramerlite Co., Inc., 577 Broadway, New York City, formerly known as the Kramer Bros. Lamp Co., Inc., and located at 583 Broadway, now manufacture in larger quantities lighting fixtures, boudoir and table lamps and art bent glass domes since the factory at 62-64 Greene street has increased its quarters and now occupies six floors. The company displayed several new units at this year's Lighting Fixture Market in Buffalo and anticipates securing contracts for the fixture equipment of numerous apartment houses now in the course of construction. The officers are: President, Samuel Kramer; secretary-treasurer, Abraham Kramer; sales manager, Samuel Rothfarb, and general manager, Mortimer Elliott, formerly with the Lightolier Co.

Consolidated Electric Co., 33 South Clinton street, Chicago, has been appointed district representative for the Bestov Manufacturing Co., Seattle, Wash., manufacturer of heating apparatus.

Pittsburgh Transformer Co., Pittsburgh, has issued bulletins Nos. 2005 and 2010 which illustrate and describe the design and construction of its types of power and distributing transformers.

International Insulating Corp., Springfield, Mass., has issued a booklet which illustrates and describes the moulded electrical insulations and sundry composition goods manufactured by it.

McIntire Corp., Newark, N. J., manufacturer of the McIntire connector sleeve for both overhead and underground work, has removed its office and factory from 35 Vesey street to 95 Olive street.

Crawford Manufacturing Co., manufacturer of Crawford induction motors, Matson cutting-off machines and gear pumps, has removed its New York sales office from 277 Broadway to 13-21 Park Row.

Sprague Electric Works of General Electric Co., 527 West 34th street, New York City, has issued bulletin No. 48967, which illustrates and describes Sprague electric hoists for various industrial purposes.

Worthington Pump & Machinery Corp., New York City, has abandoned plans for the resumption of work at its Hazleton, Pa., plant, known as the Jeanesville Iron Works, and the property will be placed on the market.

Radio Corp. of America, 233 Broadway, New York City, voted at a special meeting of the stockholders to increase the common stock from 5,000,000 shares of no par value to 7,500,000. At the regular annual meeting retiring directors were re-elected.

American Ever Ready Works, Long Island City, N. Y., recently entertained about 150 electrical and hardware jobbers of New York City and vicinity at its plant. After the luncheon a meeting was held at which F. A. Wilson-Lawrenson, sales director presided. Emmett Moore assistant general sales manager, took this opportunity to announce a continuance of the company's policy of complete jobber protection while Marquis Regan, merchandising counsel and Harry Schott, eastern sales manager, also spoke.

Goulds Manufacturing Co., Seneca Falls, N. Y., has issued two booklets entitled "Do Your Pumping Electrically," and "Running Water—How to Get It," which illustrate and describe various types of electric pumps manufactured by the company.

Shapiro & Aronson, 245 Glenmore avenue, Brooklyn, N. Y., manufacturers of lighting fixtures, have taken bids for the erection of a 1-story building, 100 by 200 ft., at Glenmore avenue and Hinsdale street, to cost about $45,000. Henry J. Nurick, 772 Broadway, is architect.

Webster Electric Co., 320 Fifth avenue, New York City, specializing in lamp service and distributor for Edison mazda lamps, reports the demand increasing and has announced that it is prepared to make contracts for lamps in any quantities. Among its large customers is the Monroe Clothes Shops, with offices in the principal cities of the United States.

General Electric Co. is perfecting plans for the construction of a plant at New Albany, Ind., for the manufacture of incandescent lamps. A tract of about 60 acres of land has been purchased at Fort Wayne, Ind., for the extension of the Fort Wayne works. The company is also arranging for the establishment of a new distributing plant at Syracuse, N. Y.

Rausch & Lang, Inc., Chicopee Falls, Mass., manufacturer of electrically operated passenger automobiles, is arranging for increased production at its plant, to include about 400 cars during the remainder of the year. The initial plant unit, 300 by 320 ft., recently completed, will be supplemented by other plant additions to permit a doubling of the present capacity during 1922. The company is capitalized at $5,000,000. Paul A. Frank is president.

National Lamp Works of General Electric Co., Cleveland, has issued Engineering Department Bulletin No. 41 on "Illuminating Design Data." It presents a simple method of illumination design adapted to general lighting systems where standard equipment is to be used and in addition to detailing the steps in the work and citing an example of a factory layout, tables and charts are presented to simplify and make more accurate the design. To illustrate the reflection factors of colored surfaces, samples of 32 different colored surfaces are shown and this section is useful in determining the coefficient of utilization applicable to an interior.

PERSONAL MENTION

Biographical Sketches and Chronicle of Changes in Business Connections, Promotions and Other Personal News of the Industry

THOMAS N. MCCARTER, Newark, N. J., has been re-elected president of the Public Service Corp. of New Jersey.

F. J. ROBBINS, formerly of Tacoma, Wash., is now connected with the Grays Harbor Railway, Light & Power Co., Aberdeen, Wash.

E. F. W. ALEXANDERSON, chief engineer of the Radio Corp. of America, 233 Broadway, New York City, is in Europe on a business trip.

CLARENCE J. BERRY, Paris, France, has gone into business for himself, specializing in illuminating engineering work in that country.

LLOYD E. ONEAL has resigned from Dwight P. Robinson & Co., Inc., New York City, and is now connected with Charles Cory & Son, Inc., New York City.

L. C. STOCKING, for 7 yrs. with the Rockford (Ill.) Gas Light & Coke Co., and recently manager of the Rockford branch of the Interstate Appliance Co., has resigned.

H. W. KILKENNY has been appointed manager of the Cleveland office of the Tubular Woven Fabric Co., Pawtucket, R. I. He was formerly connected with the General Electric Co.

W. O. ENTENMANN, formerly assistant mechanical engineer with the New York Steam Co., is now connected with the efficiency division of the power stations department of the Duquesne Light Co., Pittsburgh, as test engineer.

PROF. CHARLES T. KNIPP, of the University of Illinois, Urbana, Ill., was elected president of the Illinois Academy of Science at the recent meeting of that organization held at Carbondale, Ill. Dr. Henry C. Cowles, of Chicago University, was retiring head of the organization.

W. F. BENOIST, who has been head of the sales department of the Automatic Electric Co., Morgan and Van Buren streets, Chicago, since July 1, 1919, has been promoted to the position of assistant general manager. He is succeeded as sales manager by E. C. Blomeyer, who has been connected with the company since August, 1920.

ACHESON SMITH, president of the Acheson Graphite Co., Niagara Falls, N. Y., and president of the Electric Steel Furnace Association, has been elected president of the American Electrochemical Society, which has absorbed the Electric Steel Furnace Association. Mr. Smith succeeds Walter S. Landis as president of the American Electrochemical Society.

E. P. EDWARDS, who has been assistant manager of the lighting department of the General Electric Co. for a number of years past, has been made responsible for the radio activities of the company, his appointment having veen announced by E. W. Rice, Jr., president of the company. Mr. Edwards will have immediate supervision of radio engineering, manufacturing and selling; negotiations with the Radio Corp. of America and other companies, and will in general direct the efforts of the company in the field of radio communication. He has been

E. P. Edwards.

connected with the General Electric Co. since 1899 and is well known in Schenectady, N. Y. Mr. Edwards was born in Louisville, Ky., was graduated from Rose Polytechnic Institute, Terre Haute, Ind., in 1899, and was first employed in the electric department of the Ohio Steel Co., Youngstown, O., from which company he resigned to accept employment with the General Electric Co. After completing the test course he entered the meter, instrument and switchboard department, and later the lighting department. Mr. Edwards first became interested in radio communication through association with Prof. R. A. Fessenden in connection with the latter's early activities with the National Electric Signaling Co. It was during this period that the General Electric Co. designed and manufactured the first Alexanderson high-frequency alternator, which was used by Professor Fessenden in his experimental station at Brant Rock, Mass. About this same period the General Electric Co. also manufactured and supplied to the National Electric Signaling Co., 500-cycle spark equipments up to capacities of 100 kw., some of which were installed by the Navy Department, which is still using a 100-kw. set at its Arlington, Va., station. Mr. Edwards was in active charge of the company's radio program during the war, during which time equipment was furnished to the Navy Department and Signal Corps. He was subsequently active in the negotiations leading up to the formation of the Radio Corp. of America.

FREDERICK M. SAMMIS, manager of the incandescent lamp department of the Westinghouse Electric International Co., New York City, is on a trip around the world.

FREDERICK A. FARRAR, vice-president of the Electric Bond & Share Co., New York City, gave an interesting address last month at a dinner arranged by Frederick Pierce & Co., Philadelphia, utility securities, for their employes.

RANDOLPH E. TYLER, Philadelphia, for the past 14 yrs. district representative for the Shelby Division of the National Lamp Works of General Electric Co., has become connected with the Schimmel Electric Supply Co., 526 Arch street.

SENATOR WILLIAM B. MCKINLEY, president of the Illinois Traction System, Champaign, Ill., was elected president of the Mississippi Valley Association at its recent meeting held in New Orleans, La. Governor John M. Parker of Louisiana was elected honorary president of the Association.

F. E. WYNNE and J. V. DOBSON, specialized railway electrical engineers of the Westinghouse Electric & Manufacturing Co., gave an illustrated lecture at the Westinghouse Club on Friday evening, May 6, on "What We Saw in Europe." These two engineers have just returned from a trip through Europe, where they visited England, Norway, Sweden, Germany, Switzerland, Italy and France. They were sent abroad by the Westinghouse company to study in general the practice in railway electrification and engineering tendencies. They also brought out in their lecture the development of waterpower and its use on railroads.

OBITUARY.

JOSEPH E. DOUGHERTY, treasurer of the Peoples Gas Light & Coke Co., Chicago, died April 28 at San Diego, Cal. He was born in Chicago in 1871 and was made treasurer of the company June 1, 1917. His home was at Western Springs, Ill.

ALBERT E. ABBOTT, president of the Abbott Light & Power Co., Petersburg, Ill., died April 20. He succeeded his father, the late John B. Abbott, as president of the company, which for 25 yrs. has operated an electric light and power business in Petersburg and other Central Illinois towns.

CHARLES H. MORSE, who developed the extensive business of Fairbanks, Morse & Co., Chicago, manufacturers of electric motors, engines, pumps, machinery, etc., died May 5 at Orlando, Fla. He was born in St. Johnsbury, Vt., Sept. 23, 1833, and at the age of 17 yrs. he was employed by E. & F. Fairbanks & Co., scale manufacturers. Eight years later he came to Chicago and opened a branch office, afterwards becoming a partner in the firm.

BUSINESS OPPORTUNITIES

News of Electrical Construction Projects in All Parts of the Country, Proposals Invited, Foreign Trade Openings and New Companies

EASTERN STATES.

Dover, N. H.—The Twin State Gas & Electric Co. has arranged for a note issue of $1,000,000, a portion of the proceeds to be used for extensions and improvements in plant and system. Samuel Insull is president.

Malden, Mass.—The Malden Electric Co. has made application to the Department of Public Utilities to issue 5340 shares of stock at $125 a share, the proceeds to be used for new plant and system construction, and general operations.

Worcester, Mass.—The New England Power Co. has been granted permission by the Department of Public Utilities to issue stock to the amount of $250,000, the proceeds to be used to defray in part expenditures for extensions and improvements in generating plants and distributing system.

Worcester, Mass. — Considerable electrical and mechanical equipment will be installed in the automobile service and repair building to be erected by the Worcester-Buick Co., 799-803 Main street, on Shrewsbury street. It will be 1- and 2-story and is estimated to cost $150,000.

Wrentham, Mass.—Electrical equipment will be installed in the 2-story industrial building, 35 by 105 ft., to be erected by the Commonwealth of Massachusetts, Mental Disease Commission, State House, Boston, at the state school at Wrentham, estimated to cost $50,000.

Waterbury, Conn.—The Connecticut Light & Power Co. has sold $6,500,000 first and refunding mortgage 7% sinking fund bonds, series A.

Albany, N. Y.—Sweetzer & Bainbridge, Inc., Tivoli street, has awarded a contract to Bame & Cardell, 628 Park avenue, for the erection of a 2-story power house at its works, 26 by 90 ft.

Brooklyn, N. Y.—Considerable electrical and mechanical equipment will be installed in the 4-story plant, 50 by 100 ft., to be erected by the Empire Biscuit Co., 30 Waverly avenue, at a cost of about $75,000.

Brooklyn, N. Y.—The Brooklyn Edison Co., 360 Pearl street, has taken bids for the erection of a 2-story substation on Sumpter street, 30 by 100 ft., to cost about $30,000.

Brooklyn, N. Y.—The Brooklyn Edison Co., 360 Pearl street, has plans under way for the erection of an electric generating plant on Marshall street, near the Brooklyn Navy Yard, utilizing a site recently acquired from the Brooklyn Union Gas Co. The Public Service Commission has granted the company permission to issue bonds for $750,000, the proceeds to be used in connection with the work.

Cato, N. Y.—The Northern Cuyaga Light & Power Co. has filed application with the Public Service Commission for permission to build an addition to its electric power plants at Sterling and Fairhaven. The company has received a power franchise to operate in these districts.

Catskill, N. Y.—The Catskill Mountain Telephone Co. has received permission from the Public Service Commission to make extensions and improvements in its system, and issue bonds to defray the cost of the work.

Ellenville, N. Y.—The Ellenville Electric Co. has filed notice of increase in its capital stock from $30,000 to $60,000.

Herkimer, N. Y.—The new lighting system proposed for Myers Park will include eight pedestal lighting posts, four to be used 10 ft. inside the circular path and one at each corner of the park. Address Arthur T. Clark, superintendent of Lighting Commission.

Jamestown, N. Y.—The Bureau of Water and Lighting, City Hall, has awarded a contract to Mullen, Guinnane & Ludwig, 209 Main street, for the erection of the municipal electric lighting plant on Steele street, 3-story and basement, 90 by 244 ft.

Mt. Vernon, N. Y.—Electrical, mechanical and refrigerating equipment will be installed in the ice plant to be erected at 13th avenue and 3rd street by the Yonkers & Mt. Vernon Ice Corp. It will be 100 by 128 ft., and is estimated to cost in excess of $75,000. Sibley & Featherston, 101 Park avenue, New York City, are the architects.

New York, N. Y.—Considerable electrical and mechanical equipment will be installed in the machine and repair shop at Water and New Dock streets to be erected by the Department of Plants and Structures, Municipal building, for the Department of Street Cleaning, estimated to cost $240,000. Recent bids received have been rejected, and new bids will be asked.

New York, N. Y.—In connection with the remodeling of the former Knickerbocker Hotel, Broadway and 42nd street into an office building, the former isolated electric plant has been abandoned and contract for central-station service given to the New York Edison Co. High speed electrically operated elevators will be used in place of former hydraulic cars.

New York, N. Y.—The New York Edison Co. is completing plans for the erection of an electric substation at 40th street and First avenue, to cost about $200,000 with equipment.

Atlantic City, N. J.—Considerable electrical and mechanical equipment will be installed in the 14-story hotel to be erected in the Chelsea section by W. G. Souders of W. G. Souders & Co., bankers, 2088 LaSalle street, Chicago. Robert S. DeGolyer, 7 South Dearborn street, Chicago, is the architect. Bids for erection will be asked at once.

Camden, N. J.—Electrical equipment will be installed in connection with the rebuilding of the laundry plant at the Cooper Hospital, 6th and Stevens streets, recently destroyed by fire with a loss estimated at about $25,000.

Madison, N. J.—The Borough Council has ordered the Morris & Somerset Electric Co., Morristown, N. J., to remove its lines within the municipal limits. The borough is operating its own electric plant and is not receiving any service from the company.

Millville, N. J.—W. E. S. Temple, electrical engineer, has been directed to prepare plans for building a municipal electric plant.

Smyrna, Del.—Considerable electrical equipment will be installed at the mills to be constructed by the Chesapeake Flax & Linen Corp., estimated to cost $500,000. The plant will consist of a group of buildings, with main structure, 3-story, 50 by 150 ft. Joseph M. Housten, 139 South 15th street, Philadelphia, is the architect. Charles D. Stokly is president.

Wilmington, Del.—Electrically operated hoisting machinery, electric traveling cranes and other kindred equipment will be installed on the terminal wharves and docks to be constructed by the City Harbor Commission. The project will include a transit shed, 120 by 400 ft., with extension, 120 by 600 ft., coastwise shed and other storage buildings. It is estimated to cost $1,750,000.

Ambridge, Pa.—Considerable electrical equipment will be installed in the new local plant of the Columbia Steel & Shafting Co., Carnegie, Pa., estimated to cost $3,000,000 with equipment. Hopkinson & Schaeffer, 500 Marion building, Cleveland, are the architects.

Harrisburg, Pa.—The Harrisburg Railways Co. is arranging for the construction of a pole line for feed wires on 3rd and Walnut streets, replacing present overhead equipment.

Mount Wolf, Pa.—The Edison Light & Power Co. will install new street lamps in the business district.

Philadelphia, Pa.—The Department of City Transit, 1211 Chestnut street, has awarded a contract to the Kober Construction Co., 34 South 17th street, for the erection of its proposed electrical substation on Front street, 51 by 66 ft., estimated to cost $50,000.

Philadelphia, Pa.—Considerable electrical equipment will be installed in the 3-story baking plant to be constructed by the General Baking Co., 43 East 17th street, New York City, at Kensington and Airdale avenues. The Ballinger Co., 329 South Board street, Philadelphia, is the architect.

Philadelphia, Pa.—H. H. Kline, architect, 1612 South 4th street, has plans

under way for the construction of a 1-story powerhouse to be used in connection with a dye works at 5100 Lancaster avenue. Bids will be asked at an early date.

Pittsburgh, Pa.—The West Penn Power Co. is perfecting plans for the acquisition of 37 electric companies operating in Clarion, Armstrong and other counties in this section. The merger will allow the Penn company to extend its facilities and operations throughout this district. The company has also made application to the Public Service Commission for permission to acquire the entire capital stock of the Clarion Electric and Red Bank Electric companies.

Reading, Pa.—The Reading Hospital Commission will take bids within the next few weeks for the erection of its proposed power plant at Front and Spring streets, to be used in connection with a mechanical laundry at this location. Isaac H. Francis, Otis building, Philadelphia, is mechanical engineer for the work.

Wilkes-Barre, Pa.—Considerable electrical machinery, including motors, etc., will be installed in the 1-story silk mill addition to be erected at the plant of Hess, Goldsmith & Co., Ash street and Daisy lane, estimated to cost $165,000.

Baltimore, Md.—The Public Service Commission has granted permission to the United Railways & Electric Co. to purchase additional equipment.

Baltimore, Md.—Engineers employed by the city to investigate the waterworks system have tendered a report to the Water Bureau recommending the construction of an electrically operated pumping plant near Lake Montebello to cost about $850,000 with machinery.

Washington, D. C.—The Bureau of Yards and Docks, Navy Department, has completed plans for the installation of a new electrical distributing system at the Charleston, W. Va., navy yard property.

Romney, W. Va.—The Farmers' Electric Co. has been incorporated with a capital of $25,000 to operate a local electric plant and system. The incorporators are J. W. Shull, James O. Blue and J. S. O'Hara.

Wheeling, W. Va.—The Wheeling Steel Corp. will install considerable electrical equipment at its proposed wire and rod mill, to be located in the vicinity of Portsmouth. A finishing department will also be provided for the manufacture of wire fence, wire nails, etc. The new plant, it is said, will cost in excess of $500,000.

Asheville, N. C.—The French Broad River Development Co., Hendersonville, N. C., has surveys under way for the construction of a hydroelectric power plant on the French Broad river, in the vicinity of Asheville. The initial capacity will be about 1000 hp. J. H. Pratt, Chapel Hill, N. C., is the engineer.

Denmark, N. C.—The American Telephone & Telegraph Co., 195 Broadway, New York City, will erect a 2-story telephone operating building. Murphy & Dana, 331 Madison avenue, New York City, are the engineers.

Bibb City, Ga.—The Common Council is perfecting plans for a bond issue of $30,000 to be used for extensions and improvements in the municipal electric power plant.

Elberton, Ga.—The citizens have voted $15,000 to improve the electric light plant. Address the mayor.

Gulfport, Fla.—The Town Council is perfecting plans for the installation of a new street-lighting system. Service for operation will be rendered by the St. Petersburg Lighting Co., St. Petersburg, Fla.

Sebring, Fla.—The city has voted $250,000 electric light, waterworks and street-improvement bonds. Address the mayor.

NORTH CENTRAL STATES.

Ansonia, O.—Bids will be received May 19 for the purchase of $5500 6% bonds for the purpose of completing and extending the waterworks and electric light system. Address Thomas W. Winbigler, city clerk.

Assyria (Bellevue), Mich.—An election was held May 9 to vote on the question of issuing $25,000 electric light bonds. Address the mayor.

Marcellus, Mich.—The council will submit to vote $15,000 bonds for securing a new steam engine, generator and exciter and a switchboard-panel and equipment for same for a new waterworks and electric light plant. Address the mayor.

Northville, Mich.—The power plant of the Detroit Edison Co. was struck by lightning recently, causing a loss of about $25,000.

Kentland (McClellan), Ind.—The city plans to construct an electric light plant. Address Ora E. Sellers, trustee.

Knightstown, Ind.—Electric light bonds to the amount of $25,000 were offered for sale May 9. Address Robert M. Parker, town clerk.

Newcastle, Ind.—Action taken by the City Council will permit Newcastle to become indebted to the extent of $30,000 in order to furnish bonds for the installation of a new street-lighting system and the rebuilding of the present fire-alarm system. Address the mayor.

Centralia, Ill.—Plans and specifications for a "white way" lighting system have been presented to the City Council. Address city clerk.

Ashland, Wis.—The Wisconsin Telephone Co. will erect aerial and underground conduits this summer at an estimated cost of $60,000.

Green Bay, Wis.—The City Council has directed the city clerk to give a 30-day notice of assessment against property abutting on the streets on which the new ornamental street-lighting system is being installed to pay part of the cost of such installation.

Oconto Falls, Wis.—Bonds to the amount of $50,000 will be issued for waterworks extensions and electric light improvements. Address the mayor.

Two Rivers, Wis.—Plans have been prepared by Vaughn & Meyer, Security building, Milwaukee, engineers, for remodeling switchboard and changing to the 3-phase system, erecting steel poles and rebuilding electric distributing system. Address Joseph Doleysh, city clerk.

Viroqua, Wis.—The Wisconsin-Minnesota Light & Power Co. will make improvements to its distributing system plant at an estimated cost of $30,000.

Darwin, Minn.—The village has raised $10,000 for electric light service and may connect with the Dassel lines. Address the mayor.

Rochester, Minn.—The City Council has completed a $300,000 paving program for the summer. It has instructed the Rochester Public Utility Co. to establish an additional six blocks of "white way" in the city. Address city clerk.

Rushford, Minn.—R. R. Watts of Caledonia will superintend the construction of an electric transmission line from Rushford to Peterson. The line will be 7 mi. long.

Iowa Falls, Ia.—If present plans mature, Iowa Falls will have a municipal electric light plant estimated to cost $150,000. Petitions have been circulated recently asking the City Council to call a special election to vote on a $150,000 bond issue with which to erect an electric light plant. Address the mayor.

Higginsville, Mo.—The Town Council has disposed of a bond issue of $12,000 for the installation of an electric-lighting system.

Independence, Mo.—The Common Council has arranged for a special election June 1 to vote bonds for $35,000 for the installation of new electrical equipment at the municipal power plant.

West Point, Neb.—Bonds to the amount of $58,000 will be voted on shortly for the construction of a municipal light and power plant. Address the mayor.

Brookings, S. D.—Bonds to the amount of $60,000 have been voted for improvement of the city light, power and heating plant. Address the mayor.

SOUTH CENTRAL STATES.

Chavies, Ky.—The Johnson-Hogg Coal Co. is planning the installation of considerable electrical and mechanical equipment at its properties. A double-type tipple will be constructed. The entire work is estimated to cost close to $1,000,000.

Dawson Springs, Ky.—The Treasury Department, Washington, D. C., has commenced the erection of a power plant at the Dawson Springs government sanatorium, to cost about $45,000.

Martin, Tenn.—The Common Council has arranged for a bond issue of $100,000 for the installation of a municipal power plant, in connection with the waterworks system. Frank L. Wilcox, Chemical building, St. Louis, is the engineer.

Memphis, Tenn.—A bond election will be held May 19 to vote bonds for $10,000,000 for the establishment of a municipal electric power and gas plant. W. B. Fowler is city engineer.

Dothan, Ala.—The city plans to dispose of $750,000 hydroelectric and waterworks bonds. Address R. W. Lisenby, city clerk.

Rockford, Ala.—Charles W. McEwen has commenced the erection of an

electric power plant for local commercial service.

New Orleans, La.—The Board of Commissioners is planning the installation of a new electric lighting system at the municipal freight sheds on Pauline street. W. O. Hudson is president.

New Orleans, La.—Considerable electrical machinery will be installed in the extensions to be made to the plant of the Jahncke Dry Dock & Shipping Co., estimated to cost $2,000,000.

Cotton Plant, Ark.—The Arkansas Hydroelectric Development Co. is reported to have awarded a contract to J. Livingston & Co., 70 West 45th street, New York City, for the erection of its proposed hydroelectric power plant on the Red river, near Judsonia. The company recently increased its capital stock to $3,000,000. R. R. James is president. The J. E. Sirrine Co., Greenville, S. C., is consulting engineer.

Dierks, Ark.—A company organized with a capital of $25,000 will obtain current from the Dierks Lumber & Coal Co., which will build a transmission line from its plant at Dierks. Address Abe Collins, president, DeQueen, Ark.

El Dorado, Ark.—Considerable electrical machinery will be installed in the local oil refinery to be constructed by the Arkansas Producing & Refining Co., Gazette building, Little Rock, Ark. The company is capitalized at $350,000. George A. Sonricker, El Dorado, is the architect and engineer.

Lamont, Okla.—The Oklahoma Gas & Electric Co., Oklahoma City, Okla., has secured a contract for furnishing electric light and power service here. The company has also secured a contract for supplying service at Billings, Okla.

Eastland, Tex.—The Oil Fields Electric Railway Co., recently organized, is planning the construction of an interurban electric railway system in this section. W. Y. Fleming heads the company.

El Paso, Tex.—A tentative plan for the lighting of the business district of the city has been adopted, whereby lighting similar to that of San Francisco and Texas streets would be provided. Figures were secured on the basis of districts of 300 and 500 lamps. Address the mayor.

WESTERN STATES.

American Falls, Ida.—The U. S. Reclamation Service plans a new power plant with a capacity of 30,000 kw. located on the west bank of the Snake river just below the falls. It will be one of the largest on Snake river, and will supply power for pumping service on the Minidoka and North side projects.

Grandview, Ida.—The Grandview Light & Power Co. has been incorporated with a capital of $10,000.

Chehalis, Wash.—Installation of a modern lighting system on the city's business streets is provided for in a council resolution, hearing on which is set for May 31. Address city clerk.

Portland, Ore.—Reconstruction plans and betterment projects are under way and in prospect on the interurban lines of the Portland Railway, Light & Power Co., estimated to cost $150,000.

Salem, Ore.—Attorney L. H. McMahan contemplates the expenditure of $50,000 in the development of waterpower from Mill creek for the generation of electrical energy for commercial purposes.

Altadena, Cal.—Work will start this summer by the Los Angeles Gas & Electric Corp. in extending its mains in Altadena.

PROPOSALS.

Florence, Wis.—Bids will be received up to May 16 on structural steel and 60-70 steel towers for a transmission line for a hydroelectric power plant 8 mi. south of here on Pine river. Address Peninsular Power Co., Madison, Wis. Mead & Seastone, Madison, Wis., are the engineers.

St. Joseph, Mich.—Bids will be received May 17 for a complete curb-lighting system. Address Harry Harper, city clerk.

Marion, Ind.—Bids will be received May 17 for the following supplies: 400 cp., 6.6-ampere series burning type C lamps; 200 watt, 130-volt type C lamps. Address Claude Hamilton, clerk of public works.

Springfield, Ill.—Sealed proposals for furnishing the annual requirements of incandescent and carbon lamps to the Illinois State Charities, Penal and Reformatory Institutions, Illinois State University and State Normal Schools, will be received May 16 by the Division of Purchases and Supplies at its office in the Capitol building, Springfield, Ill., and then and there publicly opened. C. R. Miller, director; H. H. Kohn, superintendent.

Washington, D. C.—Sealed proposals will be opened in the Supervising Architect's office, Treasury Department, at 3 p. m., May 25, for the installation complete of the mechanical equipment for the power house at the U. S. Public Health Service Sanatorium, Dawson Springs, Ky., in accordance with the drawings and specifications, copies of which may be obtained at the office mentioned above in the discretion of the supervising architect.

Indianapolis, Ind.—Bids will be received May 25 for equipment and appurtenances for sewage-disposal plant. Specifications include electrically operated 5-ton powerhouse-type bridge crane and electrically operated gate valves. Address Jay A. Craven, secretary, Board of Sanitary Commissioners.

Sea Girt, N. J.—The Common Council is taking bids until May 24 for the construction of an electrically operated pumping plant at the city waterworks. J. W. Morris is borough clerk.

INCORPORATIONS.

New York, N. Y.—Deal Electric Co. Capital $25,000. To manufacture electrical products. Incorporators: J. H. Tuttle, R. Eckstein, and B. Mintz. The company is represented by Barnett & Mintz, 44 Court street, Brooklyn, N. Y.

New York, N. Y.—North American Illuminating & Engineering Co. Capital, $5000. To manufacture electric lamps, etc. Incorporators: A. N. Bernard, S. Stein and M. Bernstein, 167 East Broadway.

Elizabeth, N. J.—Jersey State Electric Co. Capital, $10,000. To manufacture and deal in electrical products. Incorporators: Joseph M. Waldo, 1182 Elizabeth avenue; Samuel Gelber and Louis Solins.

Trenton, N. J.—The F. & L. Battery & Supply Co. Capital, $100,000. To manufacture electric batteries and other electrical products. Incorporators: Charles Fishberg, Rubin Feldsher and Jacob Lens. The company is represented by Forman & Levy, 817 Broad street.

Montclair, N. J.—W. V. Ash & Co., Inc. Capital, $100,000. To operate as electricians. Incorporators: Walter C. Ash, Grover C. Hasbrouck and William W. Ames, 483 Bloomfield avenue.

Harrison, N. J.—Liberty Lamp Works, 113 Grand avenue, have filed notice of organization to manufacture electric lamps. The company is headed by M. H. Rosenberg, 231 First street, West Newark, N. J.

Dover, Del.—The S-T Electric Equipment Corp. Capital, $500,000. To manufacture electrical equipment. Incorporators: B. B. Smith, Thomas J. Turner and Joseph Harris, New York City. The company is represented by Truston P. Causey, Milford, Del.

Philadelphia, Pa.—Storage Battery & Appliance Corp. Capital, $300,000. To manufacture electrical appliances, storage batteries, etc. Incorporators: Wray C. Arnold, Frank W. Fry and Frank A. Cabeen, Jr.

Baltimore, Md.—Acme Electric Co. Inc. Capital, $10,000. To manufacture electrical specialties. Incorporators: Clarence D. Boyle, Louis Storm, and L. Malloy, 223 North Calvert street.

FOREIGN TRADE.

[Addresses of firms referred to in these trade opportunities may be obtained by writing to the Bureau of Foreign and Domestic Commerce, Washington, D. C., or its branch and local co-operative offices. Request for each opportunity should be on a separate sheet and the file number given.]

Electrical Supplies (34,750).—A trading corporation in France desires to secure an agency on commission for the sale of electrical and other industrial supplies. Correspondence should be in French. Reference.

Copper Cable (34,751).—An engineer in The Netherlands desires to purchase a quantity of copper cable for double electric tram lines, of about 60 kms.; 1000 tons of tram-line flange rails of a weight of 50 kms. to the meter, and 2000 tons of T railway rails, weight not definite, but approximately 40 kms. to the meter. Quotations should be made on various weights.

Electrical Equipment (34,765)—An import company in the Bahamas desires to purchase electrical equipment for the use of general contractors and builders. Quotations should be given f. o. b. New York City. Payment to be made in New York City against documents. References.

FINANCIAL NEWS

Comment on the Financial Outlook in the Electrical Industry, New Securities, Reports of Earnings, Dividends and Utility Stocks

Operating Income of New Jersey Power & Light Co. Shows Gain.

The New Jersey Power & Light Co. recently installed for the Borough of Rockaway 600-cp. lamps to replace 32-cp. lamps. These lamps, carrying a higher rate than the lamps removed, will increase the street-lighting revenue from the district mentioned. The gross revenue of the company for the 2 mo. ended Feb. 28, 1921, increased 12.8% over the gross revenue for the same period of 1920. Operating income for the 2 mo. ended Feb. 28, 1921, increased 20.4% over the same period of 1920. During the month of February, 49 new lighting and power services were connected, and 14 additional street lamps have been installed in Succasunna, N. J.

Offering of Ohio Power Co. Gold Bonds.

The Bond Department of the Continental and Commercial Trust and Savings Bank, Chicago, is offering Ohio Power Co. 20-yr. first and refunding mortgage series "A" 7% sinking fund gold bonds at a price of 95.25 and interest, to yield 7.4%. The Ohio Power Co. owns and operates electric and power generating and distributing systems in Ohio, serving in all 45 cities and towns, among which are Canton, Newark, Tiffin and Steubenville. For the year ending Dec. 31, 1920, net income after taxes, maintenance and depreciation charges was $2,477,466. The annual interest charges accruing on funded debt, on completion of the present financing, will be $1,236,875, the net income last year being twice this charge.

New England Co. Power System.

	1921.	1920.
February gross	$ 403,192	$ 414,824
Net after taxes	140,978	95,718
Surplus after interest charges	66,841	37,230
12 mo. gross	5,894,642	4,480,275
Net after taxes	1,737,379	1,490,302
Surplus after interest charges	899,705	730,210

Dayton Power & Light Co.

	1921.	1920.
February gross	$356,286	$305,944
Net after taxes	100,863	102,640
Total income	102,096	105,538
Surplus after charges	46,535	55,789
Balance after preferred dividends	28,617	38,614

Portland Railway, Light & Power Co.

	1921.	1920.
February gross	$ 815,814	$ 704,193
Net after taxes	256,726	226,488
Surplus after charges.	83,893	50,787
12 mo. gross	9,800,663	8,673,544
Net after taxes	2,957,209	2,903,519
Surplus after charges.	865,111	780,779

Tennessee Railway, Light & Power Co. and Subsidiaries.

	1921.	1920.
February gross	$ 544,844	$ 500,089
Net after taxes	205,134	204,992
12 mo. gross	6,536,845	5,635,394
Net after taxes	2,131,970	2,044,459

Republic Railway & Light Co. and Subsidiaries.

	1921.	1920.
February gross	$ 666,361	$ 658,121
Net after taxes	191,088	208,574
Total income	208,355	188,628
Surplus after charges.	49,177	69,386
12 mo. gross	8,464,314	6,585,130
Net after taxes	1,835,626	1,775,817
Total income	2,060,010	1,919,085
Surplus after charges.	438,816	541,718

Utah Securities Corp. Subsidiaries.

	1921.	1920.
February gross	$ 737,750	$ 666,309
Net earnings	356,223	315,396
12 mo. gross	8,750,030	7,494,156
Net earnings	4,181,656	3,768,131

Commonwealth Power, Railway & Light Co. and Subsidiaries.

Earnings for the 3 mo. ended March 31, 1921:

	1921.	1920.
3 mo. gross	$8,090,712	$7,620,424
Net after taxes	2,729,955	2,536,431
Surplus after fixed charges	885,220	860,079
Balance after preferred dividends	615,925	590,784
12 mo. gross	31,756,269	27,325,774
Net after taxes	9,089,206	9,218,113
Surplus after fixed charges	1,900,059	2,642,265
Balance after preferred dividends	822,879	1,565,085

Nashville Railway & Light Co.

	1921.	1920.
February gross	$ 311,137	$ 284,034
Net after taxes	77,087	74,643
Surplus after charges.	37,619	34,657
12 mo. gross	3,730,035	3,290,011
Net after taxes	708,453	785,910
Surplus after charges.	229,892	310,480
Balance after preferred dividends	104,892	185,480

Texas Power & Light Co.

	1921.	1920.
February gross	$ 447,685	$ 334,742
Net after taxes	147,205	101,285
Total income	147,572	101,447
Surplus after charges.	89,020	46,638
12 mo. gross	5,087,577	3,953,688
Net after taxes	1,422,294	1,223,621
Total income	1,426,910	1,231,781
Surplus after charges.	725,303	577,431
Balance after preferred dividends	453,178	328,931

Nebraska Power Co.

	1921.	1920.
February gross	$ 274,532	$ 237,462
Net after taxes	93,141	90,478
Total income	95,092	90,749
Surplus after charges.	57,674	58,544
12 mo. gross	2,964,004	2,498,575
Net after taxes	857,670	884,237
Total income	939,426	943,214
Surplus after charges	522,900	580,025
Balance after preferred dividends	312,900	370,025

Cumberland County Power & Light Co.

	1921.	1920.
February gross	$ 257,312	$ 215,376
Net after taxes	88,857	19,602
Surplus after charges.	32,891	*35,544
12 mo. gross	3,177,819	2,828,435
Net after taxes	1,058,102	952,220
Surplus after charges.	389,181	282,702

*Deficit.

Columbia Gas & Electric Co.

The Columbia Gas & Electric Co. for February and the 12 mo. ended Feb. 28 reports earnings as follows:

	1921.	1920.
February gross	$1,394,577	$1,348,504
Net after taxes	946,660	949,668
Surplus after charges.	516,553	543,481
12 mo. gross	14,856,260	12,583,587
Net after taxes	9,987,573	8,429,687
Surplus after charges.	4,863,094	3,549,664

Keokuk Electric Co.

February gross earnings	$ 28,767	$ 27,253
Net earnings	4,382	5,230
Surplus after charges	732	2,814
12 mo. ended Feb. 28:		
Gross earnings	359,961	322,816
Net earnings	82,125	51,375
Surplus after charges	48,684	23,226

Central Mississippi Valley Electric Properties.

February gros searnings	$ 40,974	$ 39,265
Net earnings	8,522	9,070
Surplus after charges	4,821	6,532
12 mo. ended Feb. 28:		
Gross earnings	495,647	437,520
Net earnings	123,100	85,356
Surplus after charges	86,576	55,232

Dividends.

	Term.	Rate.	Payable.
Baton Rouge Elec.	SA	$4	June 1
Baton Rouge Elec., pfd.	SA	$3	June 1
Cities Service Bkrs.	M	35.5c	June 1
Elec. Invest., pfd.	Q	1.75%	May 21
Houghton City Elec. Lt.	SA	75c	May 2
Tampa Elec.	Q	$2.50	May 16

WEEKLY COMPARISON OF CLOSING BID PRICES OF SECURITIES OF LEADING ELECTRICAL COMPANIES.

Quotations furnished by F. M. Zeller & Co., Rookery Bldg., Chicago.

	Div. rate. Per cent.	Bid May 2.	Bid May 9.
Public Utilities—			
Adirondack Electric Power of Glenns Falls, common	6	10	10
Adirondack Electric Power of Glenns Falls, preferred	6	71	72
American Gas & Electric of New York, common	..	102	102
American Gas & Electric of New York, preferred	6	39	38½
American Light & Traction of New York, common	..	92	82
American Light & Traction of New York, preferred	6	82	81
American Power & Light of New York, common	4	59	57
American Power & Light of New York, preferred	6	70	70
American Public Utilities of Grand Rapids, common	..	7	7
American Public Utilities of Grand Rapids, preferred	7	18	17
American Telephone & Telegraph of New York	..	109	108
American Water Works & Elec. of New York, common	..	5	4
American Water Works & Elec. of New York, particip	7	8	7½
American Water Works & Elec. of New York, 1st preferred	..	47	47
Appalachian Power, common	..	3	2
Appalachian Power, preferred	7	27	28
Cities Service of New York, common	+extra	243	242
Cities Service of New York, preferred	6	67¼	67
Commonwealth Edison of Chicago	8	108	108
Comm. Power, Railway & Light of Jackson, common	..	10	10
Comm. Power, Railway & Light of Jackson, preferred	6	30	30
Federal Light & Traction of New York, common	..	6½	6
Federal Light & Traction of New York, preferred	..	41	41
Northern States Power of Chicago, common	..	47	47
Northern States Power of Chicago, preferred	ex.div.7	80	80
Pacific Gas & Electric of San Francisco, common	..	49	53
Public Service of Northern Illinois, Chicago, common	7	78	78
Public Service of Northern Illinois, Chicago, preferred	6	82	82
Standard Gas & Electric of Chicago, common	..	12	12
Standard Gas & Electric of Chicago, preferred	8	34¼	35
Tennessee Railway, Light & Power of Chattanooga, common	..	¾	¾
Tennessee Railway, Light & Power of Chattanooga, preferred	6	6	6
Western Power of San Francisco, common	..	25	26
Western Union Telegraph of New York	..	94	90
Industrials—			
Electric Storage Battery of Philadelphia, common	4	98	98
General Electric of Schenectady	8	139	138
Westinghouse Electric & Mfg. of Pittsburgh, common	7	49	47